

SECOND SEMESTER DIPLOMA EXAMINATION IN ELECTRICAL AND
ELECTRONICS ENGINEERING—OCTOBER, 2014

BASIC ELECTRICAL ENGINEERING

[Time : 3 hours

(Maximum marks : 100)

PART—A

(Maximum marks : 10)

Marks

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

1. Define dependent source.
2. State reciprocity theorem.
3. Define the term potential gradient.
4. State Lenz's law.
5. What is meant by conductance?

(5×2=10)

PART—B

(Maximum marks : 30)

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

1. Define temperature coefficient of resistance and state the effect of temperature on resistance.
2. State and explain coulomb's laws of electrostatics.
3. Compare magnetic circuit and electric circuit.
4. Derive an expression for energy stored in magnetic field.
5. In an Ac circuit, the voltmeter and ammeter is connected and shows 220 V and 12 A respectively. Calculate the maximum value and average value of voltage and current.
6. Two impedances $Z_1 = (4 + j3) \Omega$ and $Z_2 = (6 - j9) \Omega$ are connected in series. Find the equivalent impedance in rectangular form and polar form.
7. Explain the significance of power factor.

(5×6=30)

PART—C

(Maximum marks : 60)

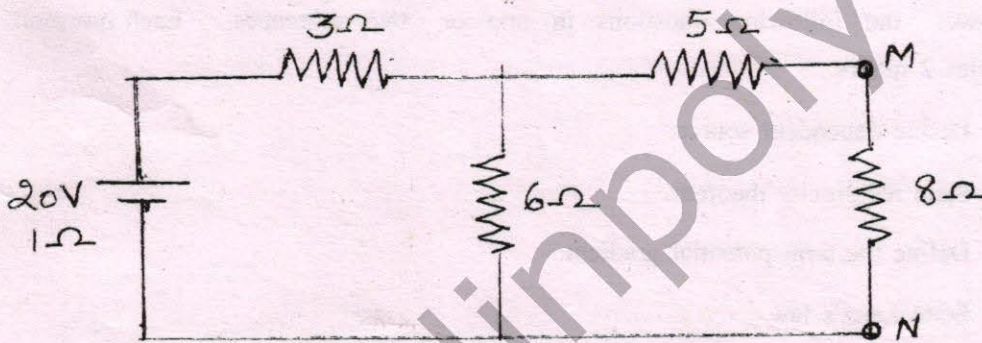
(Answer one full question from each unit. Each full question carries 15 marks.)

UNIT—I

- III (a) Define constant voltage source and constant current source and shows its conversion. 7
- (b) A coil has a resistance of $10\ \Omega$ at 15°C . What will be its resistance at 30°C ? The temperature coefficient of resistance of coil is 0.0072 per degree centigrade at 0°C . 8

OR

- IV (a) State and explain Kirchoff's laws. 7
- (b) Find the current in the $8\ \Omega$ resistor in the following circuit using Thevenin's theorem. 8



UNIT—II

- V (a) Derive the capacitance of a parallel plate capacitor in a uniform dielectric medium. 7
- (b) A potential difference of $1000\ \text{V}$ is applied across the plates of a parallel plate capacitor. The plates are separated by a dielectric of thickness $2\ \text{mm}$ and relative permittivity of 5.5 . Area of each plate is $350\ \text{cm}^2$. Calculate : 8
- (i) The capacitance (iii) The electric flux density
- (ii) The electric field intensity

OR

- VI (a) Derive the expression for potential at a point in electrostatic field. 7
- (b) Analyse the expression for magnetizing force due to long solenoid. 8

UNIT—III

- VII (a) Derive the formula for co-efficient of coupling. 7
- (b) Write short note on : 8
- (i) Frequency (iii) Average value
- (ii) Amplitude (iv) RMS value

OR

- VIII (a) Differentiate between self induced emf and mutually induced emf with expression. 7
- (b) The self inductance of a coil of 500 turns is 0.25 H. If 60% of the flux is linked with a second coil of 10500 turns, calculate :
- (i) The mutual inductance between the two coils
- (ii) emf induced in the second coil when current in the first coil changes at the rate of 100 A/s. 8

UNIT—IV

- IX (a) Write short notes on the following :
- (i) Apparent power (ii) Active power (iii) Reactive power 7
- (b) A resistor of 50Ω and an inductor of 0.1 H are connected in series across a 200 V, 50 Hz supply. Find the impedance, power factor, active power and reactive power. 8

OR

- X (a) Analyse the phasor method used to solve parallel circuits with an example. 7
- (b) A choking coil is connected in series with a $20 \mu\text{F}$ capacitor. With a constant supply voltage of 200 V, it is found that the circuit takes its maximum current of 50 A when the supply frequency is 100 Hz, calculate :
- (i) resistance and inductance of the choking coil
- (ii) voltage across the capacitor. What is the Q-factor of the coil ? 8