

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech., Summer 2018 - 19 Examination

Semester: 1/2

Subject Code: 03106101

Subject Name: Fundamentals of Electrical Engineering

Date: 20/5/2019

Time: 02:00 pm to 04:30 pm

Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (All are compulsory) (Each of one mark) (15)

1. When the speed at which a conductor is moved through a magnetic field is increased, the induced voltage _____. (Increases/Decreases/Remains constant)
2. For making a capacitor, it is better to select a dielectric having _____ permittivity.
3. A heater is rated as 230 V, 10 kW, AC. The value 230 V refers to _____ voltage.
4. The time constant of a series R-C circuit is given by _____.
5. In a certain three-wire Y-connected generator, the phase voltages are 2 kV. The magnitudes of line voltages are _____.
6. A certain appliance uses 350 W. If it is allowed to run continuously for 24 days, how many kilowatt-hours of energy does it consume?
7. Give two examples of secondary cells.
8. What is the induced voltage across a coil with 250 turns that is located in a magnetic field that is changing at a rate of 8 Weber/sec?
9. What is the unit of capacitance?
10. Which instrument is used to measure true power?
11. Ohm's law is not applicable to
 (a) DC Circuits (b) High Currents (c) Small resistors (d) Semi-conductors
12. When "n" resistances each of value "r" are connected in parallel, then resultant resistance is "x". When these "n" resistances are connected in series, total resistance is
 (a) nx (b) rnx (c) x/n (d) n²x
13. The EMF of the dry cell is about
 (a) 0 V (b) 0.5 V (c) 1 V (d) 1.5 V
14. Electrical appliances which works on the electromagnetic principle is/are
 (a) Generators (b) Motors (c) Transformers (d) All of these
15. The most common waveforms of ac is
 (a) Square (b) Triangular (c) Sinusoidal (d) Saw tooth

Q.2 Answer the following questions. (Attempt any three) (15)

- A) Derive the suitable expression for energy stored in a capacitor.
- B) Derive the formula to convert star connection in to an equivalent delta connection.
- C) Explain resonance in series R-L-C circuit. Derive the appropriate expression for resonant frequency.
- D) Differentiate between electric and magnetic circuit.

Q.3 A) Prove that in purely inductive circuit current always lags by 90° than voltage and the average power consumed is zero. Draw the phasor diagram and wave forms of voltage, current and instantaneous power. (07)

- B) Establish the relationship between line and phase voltages and currents in delta connection. Draw complete phasor diagram of voltages and currents. (08)

OR

- B) Derive the equation of charging and discharging of capacitor. Also, sketch the graph of capacitor voltage and current with respect to time. (08)

Q.4 A) Define the following terms: (07)

- (i) Magnetic flux, (ii) Magnetic flux density, (iii) Magneto motive force, (iv) Magnetic field intensity, (v) Permeability, (vi) Reluctance, (vii) Permeance

OR

- A) Derive the suitable formula for measurement of power factor in balanced 3-φ circuit. (07)
- B) Define real power, reactive power and apparent power with suitable mathematical expressions. (08)
 Draw the power triangle and impedance triangle in series R-L circuit.