Combined First and Second Semester B.Tech.
Degree Examination, March 2018
(2013 Scheme)
13.108 : BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (FR)

Time : 3 Hours                        Max. Marks : 100

PART – A

Answer all questions. Each question carries 2 marks.

1. State and explain superposition theorem.

2. Explain the concept of time constant in an electrical circuit.

3. Define bandwidth and Q factor for a series resonant circuit.

4. Differentiate between statically induced emf and dynamically induced emf.

5. What is active power in an ac circuit? How is power factor obtained?

6. Explain the working principle of a moving coil instrument.

7. Derive the emf equation of a transformer.

8. Why is earthing essential? How is it done?

9. Draw and explain the working of a diode rectifier circuit.

10. Explain the construction and working of an SCR.

P.T.O.
PART – B

Answer **any one full** question from **each** Module. **Each** question carries 20 marks.

**MODULE – I**

11. a) State and explain Thevenin's theorem.

b) $360 \text{ V}$

\[
\begin{array}{c}
30 \Omega \\
\downarrow \\
150 \Omega \\
\downarrow \\
R_L
\end{array}
\]

i) Find $R_L$ that results in maximum power transferred to $R_L$.

ii) Find the corresponding maximum power delivered to $R_L$.

c) Find the Norton equivalent circuit of the following circuit :

\[
\begin{array}{c}
8 \Omega \\
\downarrow \\
2A \\
\downarrow \\
4 \Omega \\
\downarrow \\
12V \\
\downarrow \\
8 \Omega \\
\downarrow \\
5 \Omega
\end{array}
\]

**OR**


b) Derive an expression for resonant frequency of a two-branch parallel circuit consisting of $R_L – L$ and $R_C – C$ branches.

c) Explain the variation of admittance for a parallel resonant circuit.

**MODULE – II**

13. a) Derive the relation between line and phase voltages of a balanced star connected three phase system.

b) Find the rms value and average value of a half rectified sine wave.

c) A resistor of 10 $\Omega$, an inductance of 0.3 H and a capacitance of 100 $\mu F$ are connected in series across a 230 V, 50 Hz supply.

Find :

1) Circuit impedance
2) Current
3) Power in watts
4) Power factor

**OR**
14. a) A mild steel ring of 30 cm mean circumference has a cross sectional area of 6cm² and has a winding of 500 turns on it. An air gap of 1 mm is cut in the magnetic circuit. It is found that a current of 4 A in the winding provides a flux density of 1T in the air gap. Find
   i) relative permeability of mild steel.
   ii) inductance of the winding.

b) A 50 Hz sinusoidal voltage (40 + j 30) V is applied to a series R-L circuit resulting in a sinusoidal current of (4 + j1) A. Calculate
   1) impedance of the circuit
   2) power factor of the circuit.

   c) Briefly explain the working principle of a digital multimeter.

   MODULE – III

15. a) Explain the classification of dc generators.

   b) What is the role of fuses, MCBs and ELCBs in an electrical system?

   c) Explain the different types of single phase induction motor.

   OR

16. a) Derive the condition for maximum efficiency of a transformer.

   b) Briefly explain how a stepper motor works.

   c) Explain the construction of a dc machine.

   MODULE – IV

17. a) Explain the working of zener voltage regulator.

   b) Explain the amplification action of a BJT.

   c) Explain the working of a solar cell.

   OR

18. a) Compare the ripple factor for a half wave rectifier and a full wave rectifier.

   b) Explain the significance of pinch off voltage in a JFET.

   c) Explain the working principle of UPS.