

[Total No. of Questions - 9] [Total No. of Printed Pages - 2]
(2125)

15031

B. Tech 1st / 2nd Semester Examination
Basic Electrical Engineering (OS)

EE-1001

Time : 3 Hours

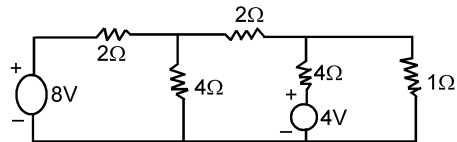
Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Total No. of 5 questions to be attempted. Section E is compulsory, 4 questions to be attempted from sections A, B, C, D, selecting at least one from each.

SECTION - A

1. State Norton's theorem. Determine current through 1Ω resistor in the network by using Thevenin's theorem. (20)



2. State and prove maximum power transfer theorem for D.C. networks. A circuit takes a current of 8A at 100V, the current lagging by 30° behind the applied voltage. Calculate the impedance, resistance, reactance and inductance of the circuit if the frequency is 50Hz. (20)

SECTION - B

3. With the aid of a phasor diagram, obtain the relationship between the line and phase values of voltage in a three phase star connected system. Three balanced loads are connected in delta and take a power of 30kW at 0.8 power factor from a 3ϕ 415V supply. Calculate the line current. (20)

[P.T.O.]

2

15031

4. In a resonant series RLC circuit, show that the total energy is a constant. Derive the quality factor of a series RLC circuit at resonance. A series RLC circuit has $R=10\Omega$, $L=0.1\text{H}$, $C=8\mu\text{F}$. Determine (i) resonant frequency (ii) Q factor of the circuit. (20)

SECTION - C

5. Draw the phasor diagram of a single phase transformer at lagging power factor load. Derive the expression for voltage regulation of a single phase transformer at lagging power factor load. (20)
6. Explain the construction and working principle of a 3ϕ induction machine. How a rotating magnetic field is produced in its air gap? (20)

SECTION - D

7. Describe with the aid of a carefully labelled diagram, the construction of a moving coil instrument. How control and damping torques are obtained? (20)
8. What is an energy meter? Explain its working principle. Explain the various errors occurring in an energy-meter. (20)

SECTION - E

9. (i) The branch currents of a parallel circuit are as follows:
 $I_1 = 2 - j3\text{ A}$, $I_2 = 4 + j6\text{ A}$, $I_3 = 3 - j5\text{ A}$. Find out the total current and express it in polar form.
- (ii) Define the meaning of term power factor, active power and reactive power as applied to an a.c. circuit.
- (iii) Why a rotating field system is used in preference to a stationary field in a synchronous machine?
- (iv) Why is starting current very high in a d.c. motor? How does the starter reduce the starting current to a safe value? (5×4=20)