

R18

Code No: 151AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year I Semester Examinations, January/February - 2024

BASIC ELECTRICAL ENGINEERING

(Common to EEE, CSE, IT, CSIT, ITE, CE(SE), CSE(CS), CSE(DS), CSE(N), CSD)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(25 Marks)

- 1.a) State Superposition theorem. [2]
- b) Draw the time response of the current in a series RC circuit when excited by D.C source at $t=0$. [3]
- c) Define resonance of A.C series R-L-C circuit. [2]
- d) Define the rms value and average value of an alternating quantity. [3]
- e) List the different three phase connections of a transformer. [2]
- f) Explain the principle of operation of single phase transformer. [3]
- g) Define the slip of a 3 phase induction motor. [2]
- h) Draw the slip torque characteristics of 3 phase induction motor. [3]
- i) What is the necessity of earthing? [2]
- j) Draw the schematic diagram of LT Switchboard. [3]

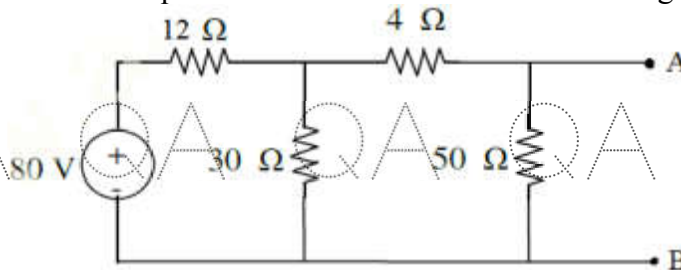
PART - B

(50 Marks)

- 2.a) Explain the V-I relation of circuit elements R, L and C.
- b) A resistance of 20Ω is connected in series with a condition of two resistances arranged in parallel each of value 40Ω . Determine the resistance R_3 which should be shunted across the parallel combination so that the total currents drawn by the circuit is 1.5A with applied voltage of 40V. [5+5]

OR

- 3.a) Find the Thevenin's equivalent for the circuit shown below figure.



- b) A lamp can work on a 50 volt main taking 2 amps. What value of the resistance must be connected in series with it so that it can be operated from 200 volt mains giving the same power? [5+5]

4.a) Derive the voltage and current relations in three phase balanced circuits for star connection.

b) A series circuit with a resistor of 50Ω , capacitor of $20\mu\text{F}$ and inductance of 0.2H is connected across 230V , 50Hz supply. Calculate the Current, Power and Power factor in the circuit. [5+5]

OR

5.a) Explain resonance for series RLC circuit and derive the equation for resonant frequency

b) A series RLC circuit of $R=40\Omega$, $L=50.07\text{mH}$ and a capacitor is connected across a 400V , 50Hz , A.C supply. This RLC combination draws a current of 10A . Calculate (i) Power factor of the circuit. (ii) Capacitor value. [5+5]

6.a) Develop the equivalent circuit of a single phase transformer.

b) The maximum value of flux density in the core of a $250/3000\text{V}$, 50Hz single phase transformer is 1.5Wb/m^2 . If the emf /turn is 8V , determine i) primary and secondary number of turns ii) area of the core. [5+5]

OR

7.a) Explain the different types of losses that occurs in a single phase transformer.

b) The iron loss of $230/112$, 5kVA transformer is 200W , The copper loss at full load is 250W . Find the efficiency of the transformer when delivering full load power at unity power factor. [5+5]

8.a) Discuss about the working principle of split phase Induction motor.

b) Explain the working of synchronous generator. [5+5]

OR

9.a) Explain why single phase induction motors are not self-starting.

b) A 6 pole 3phase induction motor operates from a supply whose frequency is 50Hz . Calculate

i) The speed at which the magnetic field of the stator is rotating.

ii) The speed of the rotor when the slip is 0.03 [6+4]

10.a) With a neat sketch, explain the working of a ELCB.

b) Explain in detail the types of cables. [5+5]

OR

11. What are the causes of low power factor? Discuss the various methods for the power factor improvement in detail. [10]

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