Code No: 152AC

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, May - 2019
BASIC ELECTRICAL ENGINEERING
(Common to ECE, EIE)

Time: 3 hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)   Write short notes on voltage source and current source.   [2]
  b)   Define average value of a sinusoidal quantity.   [2]
  c)   What is practical transformer?   [2]
  d)   Define slip.   [2]
  e)   List out the types of wires.   [2]
  f)   State Norton's theorem.   [3]
  g)   Show that power dissipated by a pure capacitor excited by a sinusoidal source is zero.
                                                                                        [3]
  h)   Write short notes on auto transformer.   [3]
  i)   Write short notes on salient pole rotor of a 3-ϕ synchronous generator.   [3]
  j)   What is the significance of earthing?   [3]

PART-B

(50 Marks)

2.a)   Explain in detail the passive elements.
  b)   By using Thevenin's theorem shown in figure, find the current in 6Ω resistor.   [5+5]
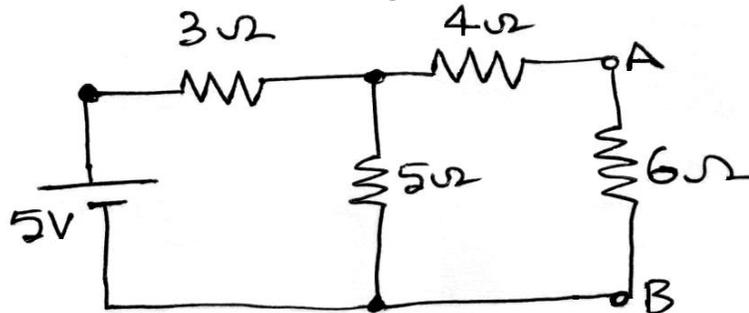
OR

3.a)   State and explain Superposition theorem by taking one example.
  b)   Three resistors: R_1=5Ω, R_2=10Ω, R_3=15Ω are connected in parallel across a DC voltage source: 100V. Find the currents I_1, I_2, I_3 through R_1, R_2, R_3 and the total current supplied by 100V source.   [5+5]

4.a) Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2, the lower and upper half power frequencies respectively.

b) A circuit consisting of three branches, Z_2 is in parallel with Z_3 the combination is in series with Z_1 having the values $Z_1=10+j30$, $Z_2 =5+j10$ and $Z_3=4-j16$ connected across single phase, 100 V, 50 Hz supply. Find i) I_1, I_2 and I_3 ii) V_1 and V_2 [5+5]

OR

5.a) Derive the expression for RMS value of alternating current wave $I = I_m \sin \omega t$.

b) A coil takes a current of 1 A at 0.6 lagging power factor from a 220 V, 60 Hz single phase source. If the coil is modeled by a series RL circuit find i) The complex power in the coil and ii) The values of R and L.   [5+5]

6.a) Draw and derive the equivalent circuit parameters of single phase transformers.

b) A single phase transformer working at unity power factor has an efficiency of 90% at both one half load and at the full load of 500 W. Determine the efficiency at 75% of full load.   [5+5]

OR

7.a) Define and explain efficiency and regulation of a transformer.

b) A 100 kVA, 1000/10000 V, 50 Hz, Single phase transformer has an iron loss of 1100 W. The copper loss with 5 A in the high voltage winding is 400 W. Calculate the efficiency at 25 %, 0.8 Power factor. The output terminal voltage being maintained at 10000 V.

[5+5]

8.a) Explain the slip-torque characteristics of 3-phase induction motor.

b) Explain the principle and operation of 1-phase induction motor.   [5+5]

OR

9.a) Explain the working principles of Synchronous generator.

b) A 6 pole, 3-ø induction motor runs at 1140 rpm on full load when supplied from a 60Hz supply. Determine the synchronous speed and slip at full load.   [5+5]

10. Explain the components of LT switch gear in detail.   [10]

OR

11. Explain the types of batteries and its important characteristics.   [10]

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