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NEE-101/NEE-201

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 199130

Roll No.

B.Tech. (Semester-I)

SPL. THEORY EXAMINATION, 2014-15

BASIC ELECTRICAL ENGINEERING

Time : 3 Hours] *[Total Marks : 100*

Note: Do as directed. Missing data if any may be suitably assumed and mentioned. Symbols have their usual meaning.

Section – A

1. Attempt all parts of this question. Each part carries two marks. 2×10=20

   (a) Define unilateral and bilateral with examples.

   (b) Three equal resistances of 5Ω are connected in star. Find the equivalent Delta.

(c) Define polyphase circuit with suitable example and waveform.

(d) Differentiate between deflection torque and controlling torque.

(e) A series circuit has R = 15Ω, L = 0.15 H, C = 5μF. Calculate Resonant frequency of the circuit.

(f) Define Flux density, reluctance and magnetic flux density.

(g) Discuss necessity of Earthing.

(h) What is the back emf in DC motor?

(i) An induction motor having 8 poles runs at 800 rpm. If the supply frequency is 50 Hz, find slip.

(j) What are the types of transformer? Explain with suitable diagram and definition.

Section – B

2. Attempt any three parts of this question. Each part carries 10 marks: 10×3=30

(a) (i) Determine current in 15Ω resistance using Thevenin's theorem and verify the same by Norton's theorem shown in figure-1.

(b) Write in detail about Slip-Torque Characteristics for three phase Induction Motor with proper diagram.

(c) Explain two wattmeter method in any star connection or Delta connection with neat diagram and phasor diagram.

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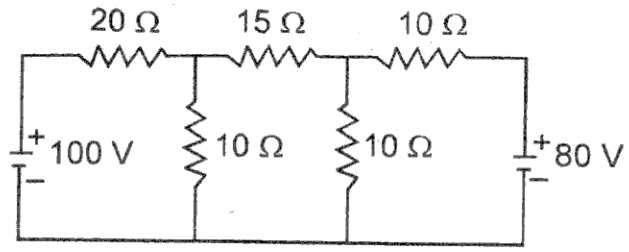

Figure-1

(ii) State and prove maximum power transfer theorem.

(b) (i) Prove that in a pure capacitor circuit average power is zero.

(ii) Give the expression for bandwidth and show the following result $Fr = \sqrt{f1 \times f2}$

(c) Describe with neat diagram the principle and working of moving iron instruments.

(d) (i) Derive the relation between line voltage and phase voltage in balanced star connection.

(ii) Derive the relation between line voltage and phase voltage in balanced delta connection.

(e) Explain the frequency curve in a series R-L-C circuit with proper labeling.

Section – C

Note: Attempt all questions of this part. Each question carries 10 marks. 5×2×5=50

3. Attempt two parts of this question:

   (a) Derive Star-delta transformation.

   (b) Find the resultant voltage of the following $v_1 = 25 \sin \omega t$, $v_2 = 10 \sin(\omega t + \pi/6)$, $v_3 = 30 \cos \omega t$, $v_4 = 20 \sin(\omega t - \pi/4)$.

   (c) Explain source transformation.

4. Attempt two parts of this question.

   (a) Derive the relation for Q-factor of the series R-L-C circuit.

   (b) An impedance of (8+j7) is connected with (3 –j4) in parallel, than further is connected with (5+j3) in series with supply of 100 v, 50 Hz. Draw the circuit diagram and hence find the current in circuit and total impedance of the circuit.

   (c) Explain the series R-L circuit with phasor diagram, power triangle, and voltage triangle.

5. Attempt any two parts of this question :

   (a) Derive the emf equation of transformer.

   (b) Give the analogy between magnetic and electric circuit. Also give the brief of B-H curve.

   (c) A wrought iron bar 30 cm long and 5 cm diameter is bent into a circular shape. It is then wound with 500 turns of wire. Calculate the current required to produce a flux of 0.5 milli weber in magnetic circuit. Assume permeability of iron is 3000.

6. Attempt any two parts of this question :

   (a) Derive the back emf of motor, also find the torque equation of the motor.

   (b) Why earthing is necessary? Explain the types of proper connection to earthing.

   (c) Define power factor. What are the measures used to improve the power factor?

7. Attempt any two parts of this question :

   (a) Why single Phase Induction Motor is not self starting? Give the various methods to start. Explain any two of them with proper diagram and phasor diagram.