[Total No. of Questions - 9] [Total No. of Printed Pages - 4]
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17029(N)

B. Tech 1st Semester Examination

Principles of Electrical Engineering (CBS)

EE-101

Time : 3 Hours **Max. Marks : 60**

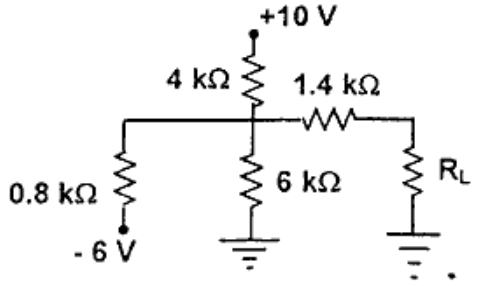
The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt any five questions in all, selecting at least one question from each section A, B, C, and D. Section E is compulsory.

SECTION - A

1. (a) Derive the necessary equations for converting a delta network into an equivalent star network. (3)

   (b) Find the Thevenin's model across R_L of the circuit given below. (6)

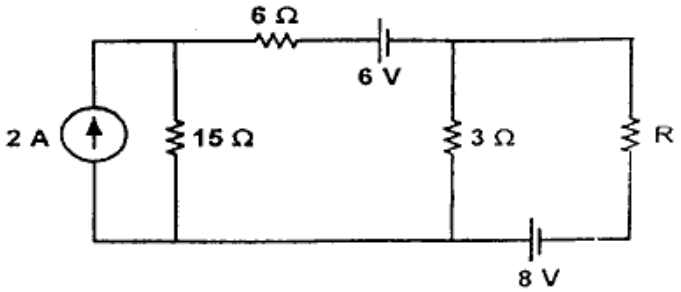


   (c) State maximum power transfer theorem. Show that for maximum power $R_L = R_{th}$ and also derive the value of the maximum power obtained. (3)

2. (a) A dc circuit comprises 2 resistors : resistor A of value 25 Ω, and resistor B of unknown value, connected in parallel, together with a third resistor C of value 5 Ω connected in series with the parallel branch. Find the voltage to be applied across the whole circuit and the value of the

resistor B, if the potential difference across resistance C is 90 V and total power consumed is 4320 W (5)

(b) State Thevenin's theorem and find the Thevenin's model across resistance 'R', shown in the circuit given below. Also find the value of resistance 'R' to have maximum power transfer in the circuit shown below. (5)

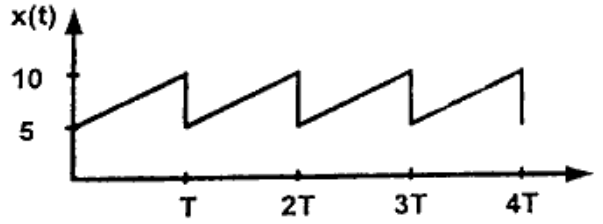


(c) Write a short note on 'Nuclear power generation'. (2)

SECTION - B

3. (a) A 3-phase balanced load connected across a 3-phase, 400V ac supply which draws a line current of 10 A. Two wattmeters are used to measure input power. The ratio of two wattmeters reading is 2 : 1. Find the readings of the two wattmeters. (6)

   (b) Find the r.m.s. and average value of the waveform shown below. (4)



   (c) What are the disadvantages of low power factor? How you can improve the power factor using a shunt capacitor without altering the power required? (2)

4. (a) Identify the circuit elements and find their values, if the voltage and current through the circuit element are V = 150 Sin(377t) & i = 10 Sin(377t + 30°). (2)

(b) A 120 V, 100 W lamp is to be connected to a 220 V, 50 Hz ac supply. What value of pure inductance should be connected in series in order to run the lamp at its rated voltage? (4)

(c) A 3-phase, three wire RYB system with effective line voltage of 150 V has a-balanced Y connected load of $Z = 5\angle 30^0\Omega$ in each phase. Obtain the line current, phase current and power supplied to the load. Draw phasor diagram also. (6)

SECTION - C

5. (a) With a neat diagram describe the construction and principle of operation of a moving iron (i) Attraction type instrument (ii) Repulsion type instrument. (7)

(b) With the help of a diagram, define

(i) Leakage reactance (ii) Useful flux (iii) Magnetic fringing (iv) Leakage factor. (5)

6. (a) With the help of neat sketch, explain the working principle of Dynamometer type watt meter with suitable mathematical expression. And also mention its advantages and disadvantages. (7)

(b) Compare electric and magnetic circuits with respect to their similarities and dissimilarities. (5)

SECTION - D

7. (a) Write a short note on 'open and short circuit test' for single phase transformers. (5)

(b) Why single phase Induction motors are not self starting? Describe the following types of Single phase Induction Motor (i) Split phase Induction Motor (ii) Capacitor start type Induction Motor. (7)

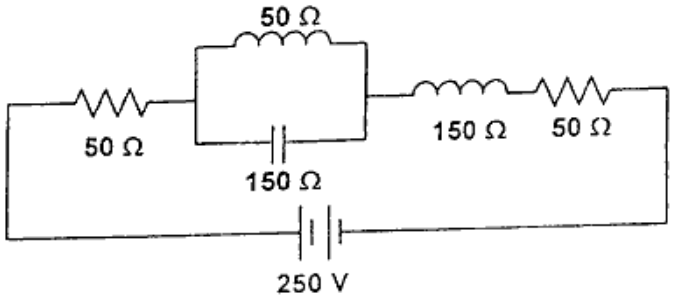
8. (a) Describe the following terms in single phase transformer (i) Efficiency (ii) All day efficiency (iii) Losses in transformer (iv) Regulation of Transformer. (7)

(b) A lap-wound dc shunt generator having 80 slots with 10 conductors per slot generates, at no-load, an emf of 400 V when running at 1000 rpm. At what speed should it be rotated to generate 220 V on open circuit? (5)

SECTION - E

9. Attempt all questions.

(a) Find the value of supply current shown in fig below.



(b) What is relationship between Thevenin's and Norton's theorem?

(c) When a resistor is placed across the 415V supply, the current is 36 A. What is the value of resistor that must be placed in parallel to increase the load to 40A?

(d) Define the terms (i) Form factor (ii) Peak factor.

(e) Define the term resonance in a RLC series circuit.

(f) Define Hysteresis losses in transformer.

(g) Derive the emf equation of single phase transformer.

(h) Discuss the term armature reaction in a dc machine.

(i) How many hours an electric lamp of 100 W takes to consume 1.5 unit of energy?

(j) Why transformer cannot be used with DC supply? (1.2×10=12)