Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 27205

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Second Semester

Electronics and Communication Engineering

EE 6201 — CIRCUIT THEORY

(Common to Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Biomedical Engineering and Medical Electronics Engineering)

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Kirchoff's current law.

2. Find the equivalent resistance of the circuit shown in Fig. 1.

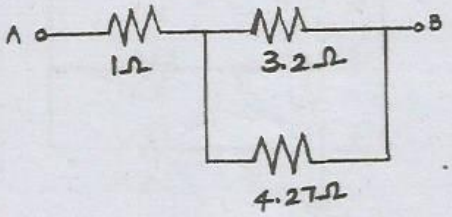

Fig.1

3. List the applications of Thevenin's theorem.

4. Two resistors of 4Ω and 6Ω are connected in parallel. If the total current is 30 A. Find the current through each resistor shown in Fig.2.

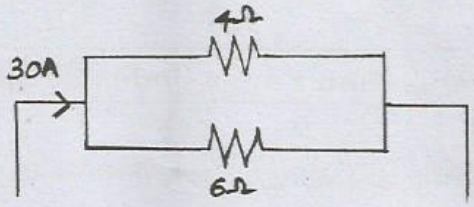

Fig. 2

5. Define selectivity.

6. What is co-efficient of coupling?

7. Distinguish steady state and transient state.

8. What is the time constant for RL and RC circuit?

9. What are the advantages of three phase system?

10. When a 3-phase supply system is called balanced supply system?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the magnitude and direction of the current in the 2 V battery in the circuit shown in Fig. 3. (8)

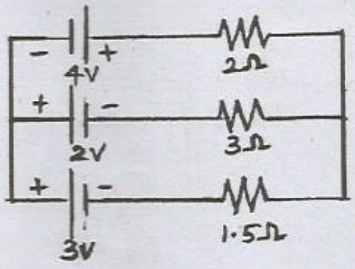

Fig. 3

(ii) Determine the power dissipation in the 4Ω resistor of the given circuit shown in Fig. 4. (8)

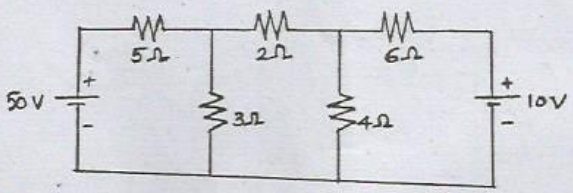

Fig. 4

Or

(b) Using node analysis, find the voltage V_x for the circuit shown in Fig. 5. (16)

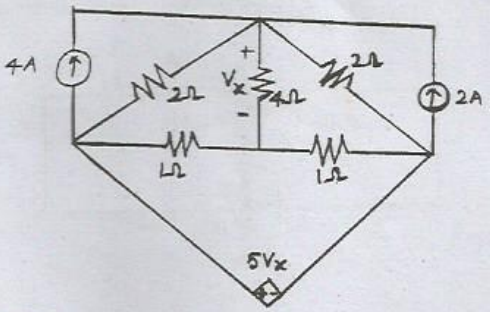

Fig. 5

12. (a) Find the Thevenin's equivalent of the network shown in Fig. 6. (16)

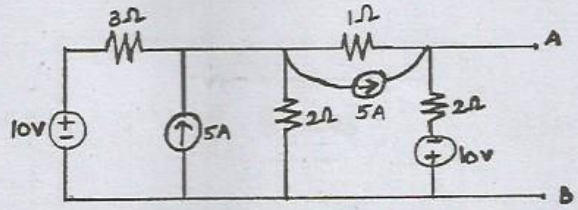

Fig. 6

Or

(b) Determine the value of resistance that may be connected across A and B so that maximum power is transferred from the circuit to the resistance. Also, estimate the maximum power transferred to the resistance shown in Fig. 7. (16)

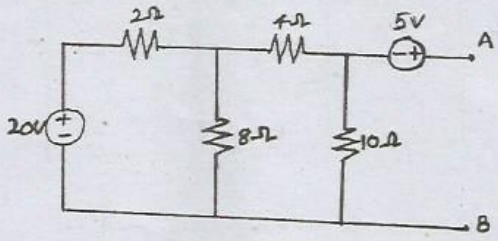

Fig. 7

13. (a) For the circuit shown in Fig. 8, determine the frequency at which the circuit resonates. Also find the quality factor, voltage across inductance and voltage across capacitance at resonance. (16)

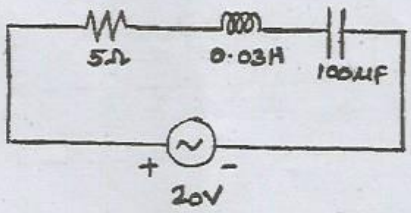

Fig. 8

Or

(b) Find the mutual reactance X_m in the coupled coils shown in Fig. 9. (16)

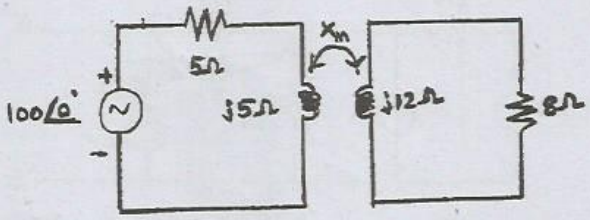

Fig. 9

14. (a) In the RL circuit shown in Fig. 10, the switch is closed to position-1 at $t = 0$. After $t = 100$ ms, the switch is changed to position-2. Find $i(t)$ and sketch the transient. (16)

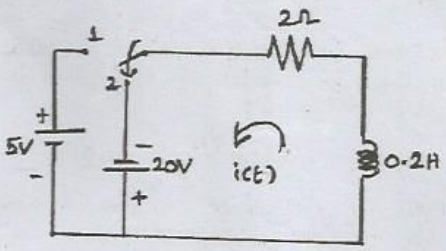

Fig. 10

Or

(b) (i) Determine the driving point impedance of the network shown in Fig. 11. (8)

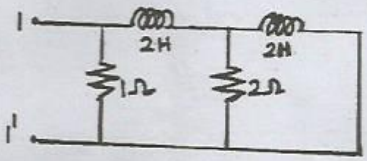

Fig. 11

(ii) Determine the h-parameters of the two port network shown in Fig. 12. (8)

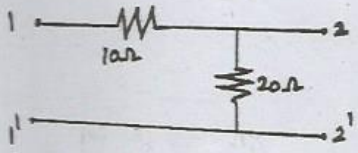

Fig. 12

15. (a) Show that three phase power can be measured by two wattmeters. Draw the phasor diagrams. Derive an expression for power factor interms of wattmeter readings. (16)

Or

(b) (i) Three equal impedances, each of $8 + j10\ \Omega$ are connected in star. This is further connected to a 440 V, 50 Hz, three phase supply. Calculate the active and reactive power and line and phase currents. (8)

(ii) Two wattmeter connected to measure the input to a balanced, three phase circuit indicate 2000 W and 500 W respectively. Find the power factor of the circuit.

(1) When both readings are positive and

(2) When the later is obtained after reversing the connections to the current coil of one instrument. (8)