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GET 201 2014/2015

71

COMMANDER

2014/2015 HARMATTAN SEMESTER EXAMINATIONS

GET 201: APPLIED ELECTRICITY I (3 Units)

MONDAY, DECEMBER 1, 2014

EXAMINATION TIME: 11:00A.M – 1.00P.M TIME ALLOWED: 3 Hours

INSTRUCTIONS: (i) write your Matric Number and Department clearly on your answer sheet(s) and question paper (ii) Answer **ALL** questions in **section A** and **any THREE** questions in **section B.**

(YOU ARE REQUIRED TO FILL IN YOUR PARTICULARS HERE AND ON THE ANSWER BOOKLET)

MATRICULATION NUMBER: 14D/67CE/100

COLLEGE: ----------

DEPARTMENT: ----------

DEGREE PROGRAMME: ----------

PLEASE TURN OVER ONLY WHEN INSTRUCTED TO START BY THE INVIGILATOR

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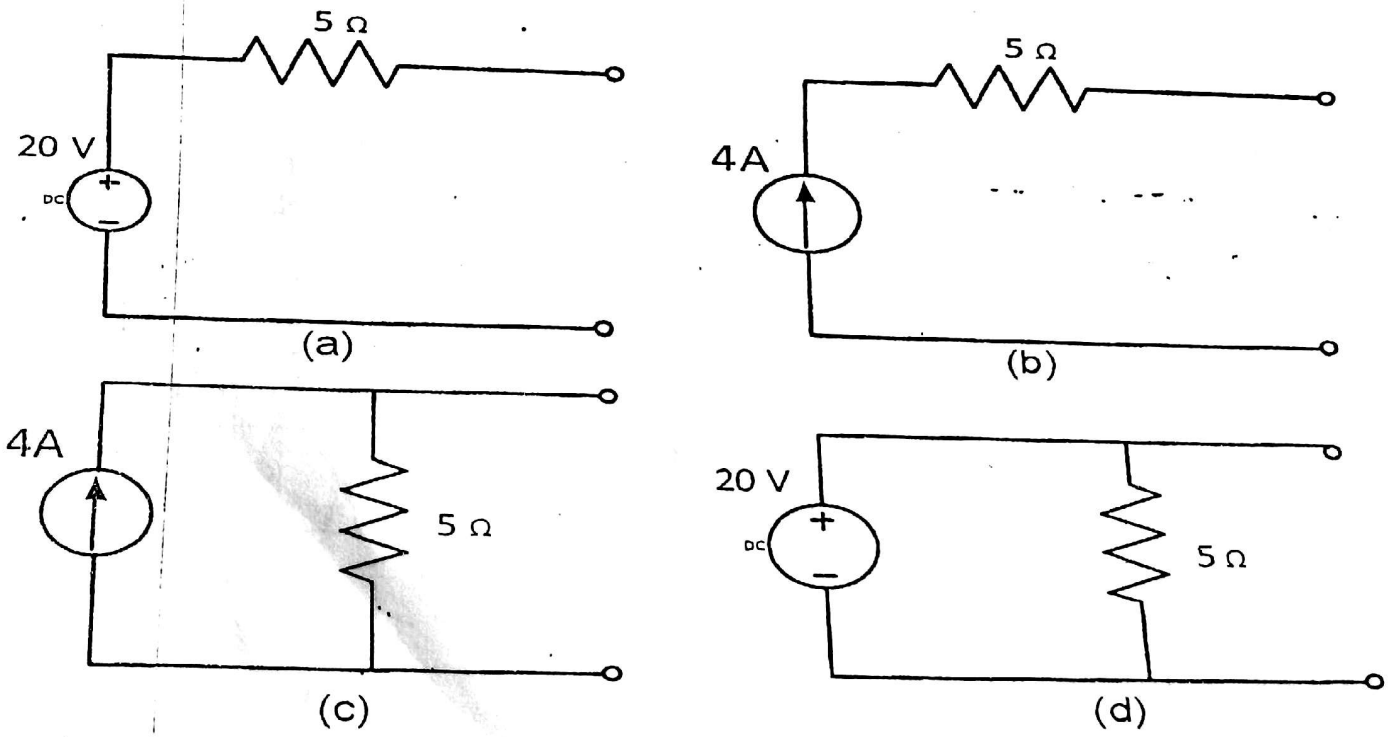
SECTION A

1. A charge of 2C following past a given point each second is a current of 2A. TRUE OR FALSE
2. A 4A current charging a dielectric material will accumulate a charge of 24C after 6s. TRUE OR FALSE
3. The current through a branch in a linear network is 2A when the input source is 10V. if the voltage is reduced to 1V and the polarity is reserved, the current through the branch is _____A
4. Which pair of circuits in Fig.Q4 are equivalent?



5. The superposition principle applies to power. TRUE or FALSE

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6. What charge is on a 5F capacitance when it is connected across a 120V source? _____C
7. When the total charge in a capacitor is doubled the energy stored: (a) is doubled (b) is quadruplet
8. The total capacitance of two 40mF series connected capacitors in parallel with a 4mF capacitor is _____mF
9. A 5H inductor changes its current by 3A in 0.2s. The voltage produced at the terminals of the inductor is _____V
10. Inductors in parallel can be combined just like resistors in parallel. TRUE OR FLASE
11. A Capacitors in an RC circuit with R = 2Ω and C = 4F is being charged. The time required for the capacitor voltage to reach 63.2% of its steady state value is _____s
12. An RL circuit has R = 2 Ω and L=4H. The time needed for the inductor current to read 40% of its steady-state value is _____s
13. The voltage across an inductor leads the current through it by 90^0. TRUE OR FALSE
14. The imaginary part of impedance is called _____
15. The impedance of a capacitor increases with increasing frequency. TRUE OR FALSE

SECTION B

QUESTIUON ONE

(a) Explain how an AC bridge can be used to measure the capacitance C of a capacitor with suitable diagram.

(b) The AC bridge circuit of Fig Q1 balances when Z_1 is a 1k Ω resistor, Z_2 is a 4.2k Ω resistor, Z_3 is a parallel combination of a 1.5M Ω resistor and a 12pF capacitor and f = 2kHz. Find the series components that make up Z_x

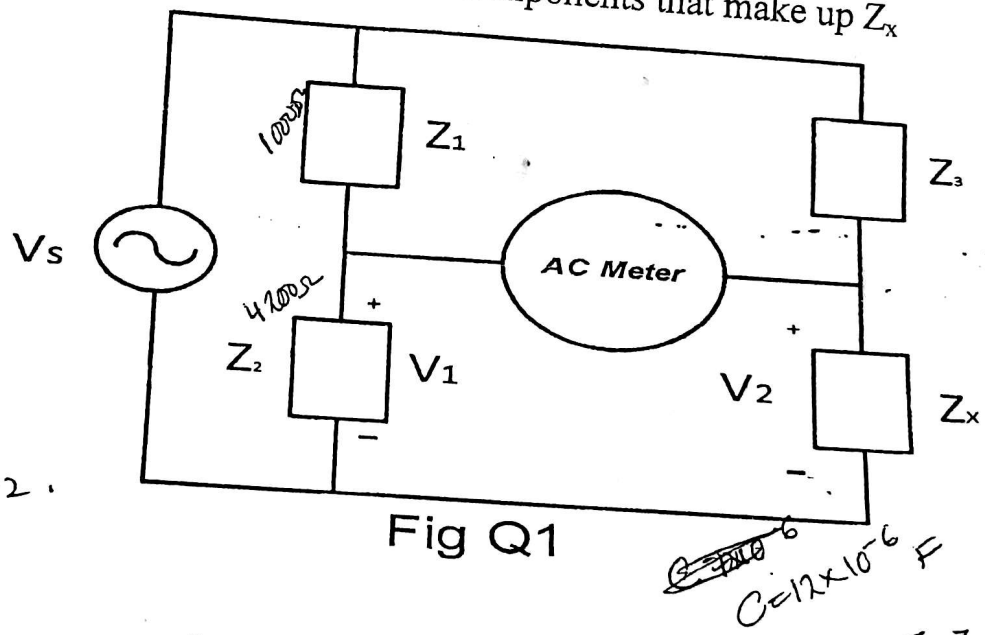

Fig Q1

QUESTION TWO

(a) Define Electrostatics

(b) Consider two equal charges in a vacuum. If they repel each other with a force of 0.25N when situated 60cm apart. Calculate:

(i) the value of each of these equal charges

(ii) the size of the charges, if they are in liquid whose permittivity is twelve and half times that of a vacuum

QUESTION THREE

(a)(i) What are Passive Elements?

(ii) Show that the voltage division rule for two capacitors in series as in Fig.Q3 aii is

$$V_1 = \frac{C_2}{C_1+C_2} V \quad , \quad V_2 = \frac{C_1}{C_1+C_2} V$$

Assuming that the initial conditions are zero.

(c) Find the resultant capacitance of the circuit shown in Fig. Q 3b

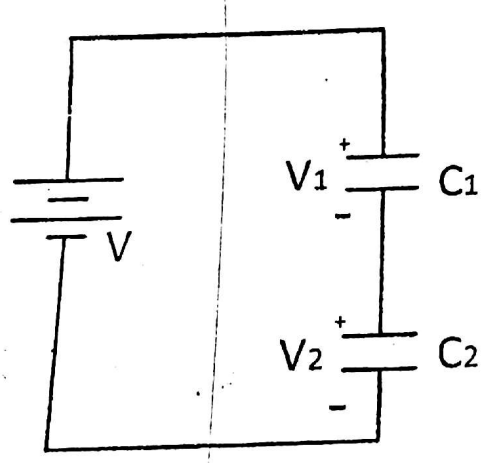

Fig Q 3aii

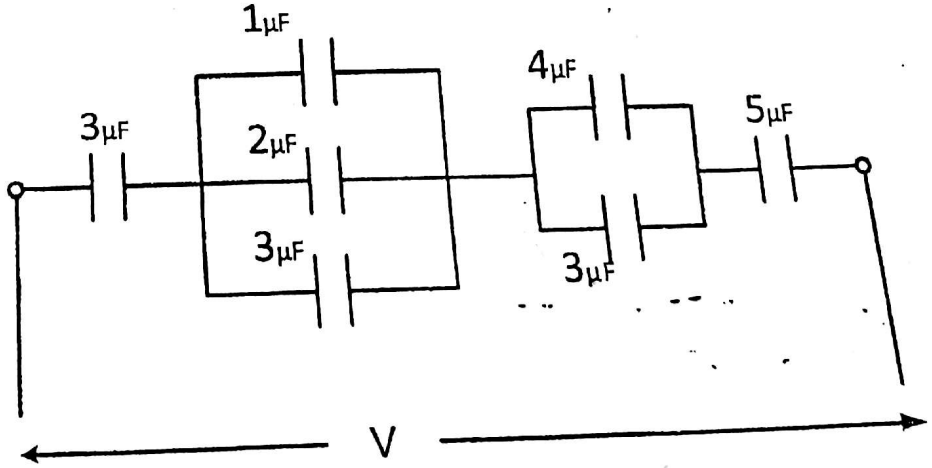

Fig Q 3b

QUESTION FOUR

(a) What do you understand by the term "Time Constant" of a circuit?

(b) Find the voltage response of the RC circuit shown in Fig.Q4b when it is known that initial value, V(0) = 10V.

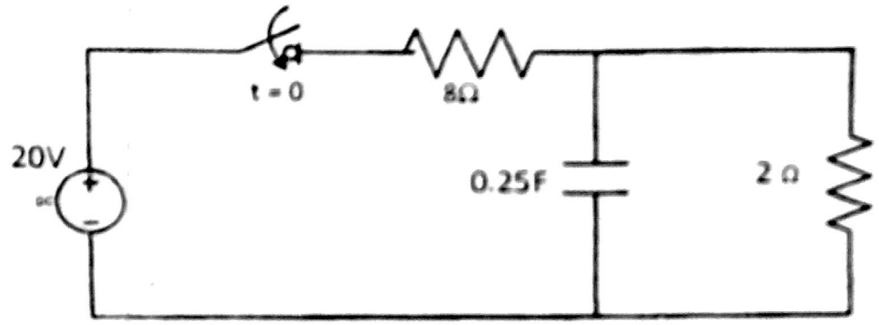

Fig Q4b

QUESTION FIVE

(a) State thevenin's theorem for electric circuits.

(b) Using Thevenin's theorem, find the current in the 20Ω resistor in the network of Figure Q5

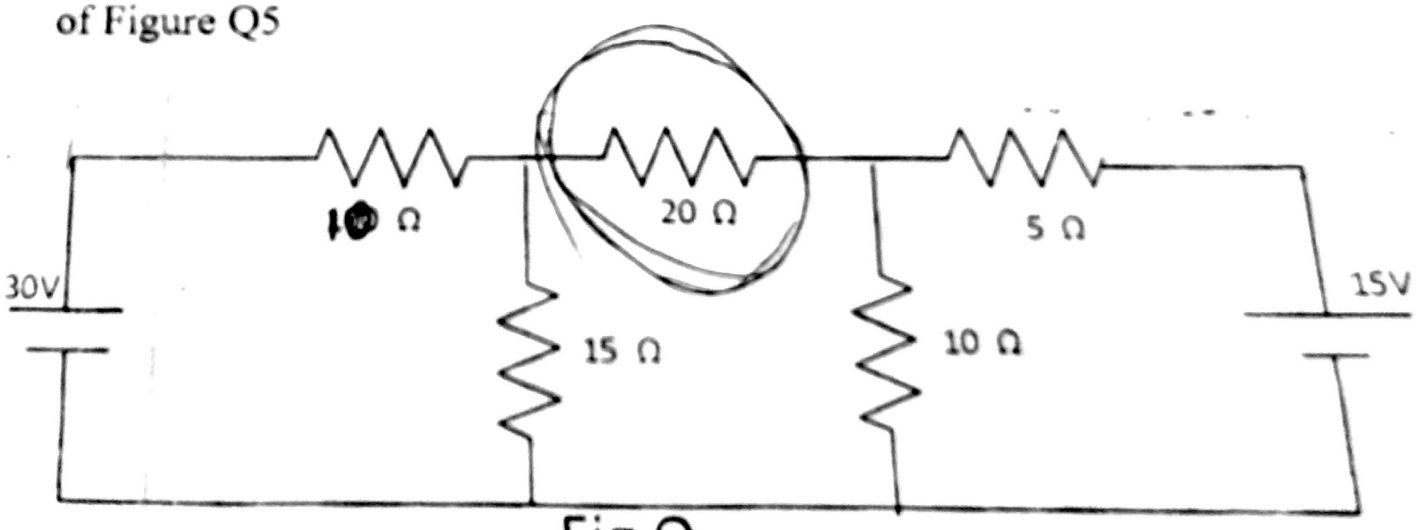

Fig Q 5