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University Examinations 2011/2012

FIRST YEAR, FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE, BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY AND BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE

SPH 2172: PHYSICS

DATE: APRIL 2012 **TIME: 2 HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE (30 MARKS)

a) Define the following terms
   i. Capacitance (2 Marks)
   ii. Electric Field Intensity (2 Marks)

b) Show that electrical power in an electrical device is given by $P=I^2R$. (6 Marks)

c) A 12V storage battery is connected to three resistors 6.75Ω, 15.2Ω and 21.6Ω respectively. The resistors are joined in series. Calculate
   i. Total resistance (2 Marks)
   ii. Circuit current (3 Marks)

d) Differentiate between
   i. Insulators and conductors (4 Marks)
   ii. Magnetic and non magnetic materials. (4 Marks)

e) A 40cm conductor is carrying current of 80A and is situated in a magnetic flux of flux density 0.8 T. find the force of the conductor if the angle between the conductor and the field is
   i. 0^o (2 Marks)
   ii. 45^o (2 Marks)

f) What factors does the magnitude of a voltage depend upon in AC circuits? (3 Marks)

QUESTION TWO (20 MARKS)

a) State Faraday's Laws of electrolysis. (4 Marks)

b) What is the resistance of a heating coil if it is the generate 15kJ of heat per minute when connected to a 120 volt source. (3 Marks)
c) With the aid of a circuit diagram, explain briefly "half wave rectification" (8 Marks)
d) Calculate the value of two equal charges if they repel one another with a force of 0.1N when situated 50cm apart in a vacuum. (5 Marks)

QUESTION THREE (20 MARKS)

a) Define the following terms
   i. Resistivity (2 Marks)
   ii. Inductance (2 Marks)
b) Three resistors 4Ω, 12Ω and 6Ω are connected in parallel. If the total current taken is 12A, find
   i. Total resistance (2 Marks)
   ii. Current through each resistor (7 Marks)
c) State three factors that determine the resistance of a conductor. (3 Marks)
d) Two capacitors of capacitance $4\mu f$ and $6\mu f$ are connected in parallel across a p.d of 120V. Calculate
   i. Total capacitance (2 Marks)
   ii. Total charge (2 Marks)

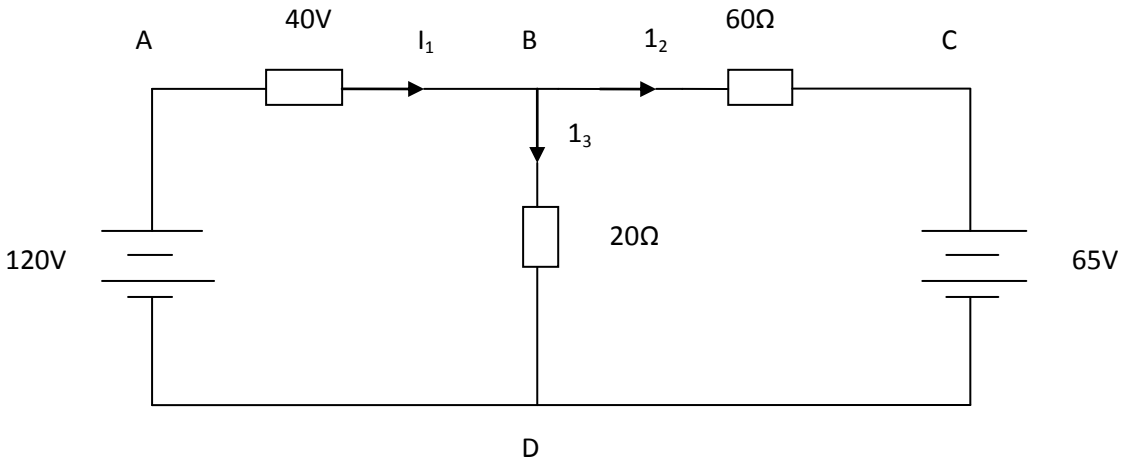
QUESTION FOUR (20 MARKS)

a) State the laws of magnetism. (3 Marks)
b) Differentiate between magnetic and electric circuits. (8 Marks)
c) A wire carrying a current of 10A and 2m in length is placed in a field of flux density 0.15T. What is the force on the wire if it is placed?
   i. A right angles to the field (2 Marks)
   ii. At 45^0 to the field. (2 Marks)
d) Differentiate between temporary and permanent magnets. (4 Marks)
e) What are magnetic fields? (1 Mark)

QUESTION FIVE (20 MARKS)

a) Define the following terms
   i. Loop (2 Marks)
   ii. Node (2 Marks)
b) State Kirchoff's Laws. (4 Marks)

c) Use mesh-current method to find the magnitude and direction of currents I_1, I_2 and I_3 in the network below.



(10 Marks)

d) State Coulomb's Law. (2 Marks)