(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR

SUPPLEMENTARY/SPECIAL EXAMINATIONS
YEAR ONE SEMESTER ONE EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

COURSE CODE   :   BIT 115

COURSE TITLE   :   BASIC ELECTRONICS FOR IT

                                        P2

DATE: 04/10/2018   **TIME: 8.00A.M – 10.00A.M**

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSARY) [30 MARKS]

a) Define the following terms   [1 marks]
   i)   Electric current   [1 marks]
   ii) Potential difference

b) Two filament lamps A and B take 0.8A and 0.9A respectively, when connected across a 110V supply. Calculate the value of current when they are connected in series across a 220V supply. (assume the filament resistance remains the same)   [4 marks]

c) A factory has a 240-V supply from which the following loads are taken :

   Lighting: Three hundred 150-W, four hundred 100 W and five hundred 60-W lamps

   Heating: 100 kW

   Motors: A total of 44.76 kW

   Miscellaneous: Various load taking a current of 40 A.

   Assuming that the lighting load is on for a period of 4 hours/day, the heating for 10 hours per day and the remainder for 2 hours/day,

   i)   Determine the weekly consumption of the factory in kWh when working on a 5-day week.
                                                                                   [4 marks]

d) Determine capacitance that must be connected in series with a 30 µF capacitor for the equivalent capacitance to be 12 µF   [2 marks]

e) Explain any three advantages of digital systems have over analog systems   [3 marks]

f) Discuss the effect of temperature on good conductors.   [3 marks]

g) Describe the behaviour of a *pn* junction under forward and reverse biasing.   [3 marks]

h) State any two advantages of full-wave bridge rectifier   [3 marks]

i) Explain the applications of the following classes of transistors.   [1 marks]

   i)   Low-noise   ii)   Switch   [2 marks]

j) Convert the binary number 1010 1011.011111$_2$ to;   [3 marks]
   i)   Hexadecimal   ii)   Decimal

k) Convert hexadecimal number A25C. 2A$_H$ [3 marks]
   i)   Binary   ii) Octal

QUESTION TWO [20 MARKS]

a) Name the three possible transistor connections. [3 marks]

b) In a common base connection, the emitter current is 1mA. If the emitter circuit is open, the collector current is 50 μA. Find the total collector current. Given that α = 0.92. [2 marks]

c) Draw a well labeled common collector NPN transistor test circuit for the various transistor characteristics [3 marks]

d) Sketch and explain the following characteristics for the test circuit of 2 c) above

    i) Input characteristic [3 marks]

    ii) Output characteristic [3 marks]

e) Explain the construction and working of a *JFET* [3 marks]

f) Describe the operation CE transistor connection as an amplifier [3 marks]

QUESTION THREE [20 MARKS]

a) Define the following terms

    i) Circuit [1 mark]

    ii) Electric network [1 mark]

b) A current of 3A flows through a circuit for 2 minutes. Determine the number of electrons that flow at a point in the circuit (1e = 1.6 x 10^{-19} C) [3 marks]

c) For the circuit shown in Figure below, find, using the Kirchhoff's law;

    i) Current that flows through the 20Ω branch. [5 marks]

    ii) Power dissipated by the 6Ω branch [3 marks]
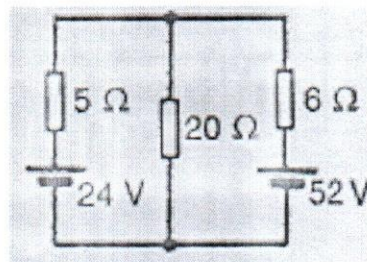
d) A circuit consisting of two capacitors P and Q in parallel, connected in series with another capacitor R. the capacitances o P, Q and R are 4μF, 12μF and 8μF respectively. When the circuit is connected across a 300V d.c supply determine;

    i) The total capacitance of the circuit [2 marks]

    ii) The p.d across each capacitor [3 marks]

    iii) The charge on each capacitor [2 marks]
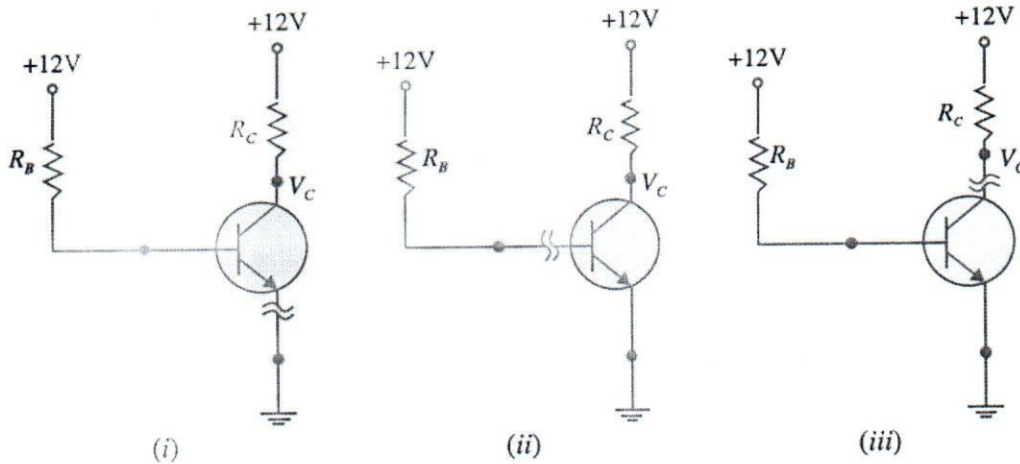
a) Write short notes on the following :

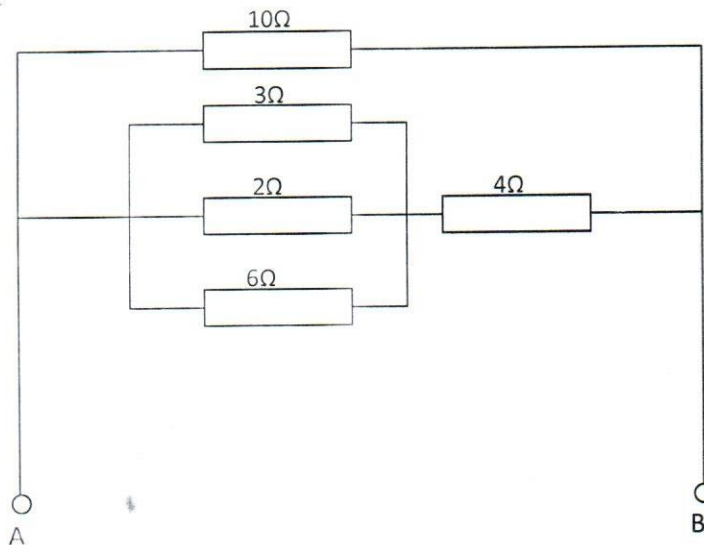   i)   Peak inverse voltage

                         [2 marks]

   ii)   Breakdown voltage

                         [2 marks]

b) The figure below shows the short circuit failures in a transistor. What will be the circuit behavior in each case?   [6 marks]

(i)   (ii)   (iii)

c) A battery having an E.M.F of E volts and internal resistance 0.2 Ω is connected across terminals A and B of the circuit


Given that the power dissipated at the 3Ω resistor is 2.25W calculate the value of E.   [5 marks]

d) Explain briefly any **Four** factors that affect resistance of a material, hence derive the for specific resistance of a material   [5marks]

a) For the arrangement shown in the Figure below Calculate;

    i) The equivalent capacitance of the circuit,   [3 marks]

    ii) The voltage across QR, and   [3 marks]

    iii) The charge on each capacitor..   [2 marks]
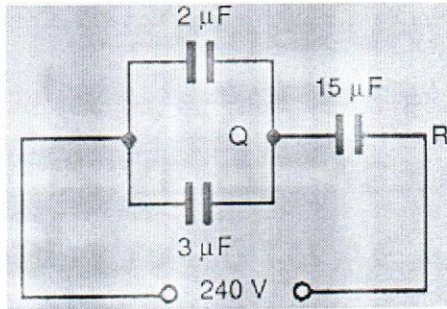
b) A capacitor is charged with 8 mC. If the energy stored is 0.4. Determine;

    i) The voltage and   [3 marks]

    ii) The capacitance.   [3 marks]

c) Describe the following types of capacitors

    i) Variable air capacitor   [2 marks]

    ii) Paper capacitor   [2 marks]

d) State one application for each case in 4 (c) above.   [2 marks]