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**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2016/2017 ACADEMIC YEAR**  
**SECOND YEAR, FIRST SEMESTER EXAMINATION**  
**FOR THE DEGREE OF BACHELOR OF SCIENCE**  
**(COMPUTER SCIENCE)**

Date: 12<sup>th</sup> August, 2016.  
Time: 8.30am – 10.30am

**KCS 203 - ELECTRONICS**

**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

- a) Explain the differences between digital and analogue electronics. (4 Marks)
- b) With the aid of a circuit diagram, explain how the input and output characteristics of an n-p-n transistor having a common-base configuration can be obtained. (10 Marks)
- c) What is crosstalk, give an example how and where it happen? (4 Marks)
- d) Why npn transistors are preferred over pnp transistors? (4 Marks)
- e) Find the required collector feedback bias resistor for an emitter current of 1 mA, a 4.7K collector load resistor, and a transistor with  $\beta=100$ . Find the collector voltage  $V_C$ . It should be approximately midway between VCC and ground. (4 Marks)
- f) A differential amplifier has an open-loop voltage gain of 120. The input signals are 2.45 V and 2.35 V. Calculate the output voltage of the amplifier. (4 Marks)

**QUESTION TWO (20 MARKS)**

- a) Why transistors are more preferred than vacuum tube. (4 Marks)
- b) What do you mean by current and voltage controlled transistors (4 Marks)
- c) Find the emitter current  $I_E$  with the 470 K resistor. Recalculate the emitter current for a transistor with  $\beta=100$  and  $\beta=300$ . Comment on beta changes from 100 to 300 (6 Marks)
- d) Two discrete diodes connected back-to-back can work as a transistor? Explain with the help of the diagrams. (6 Marks)

**QUESTION THREE (20 MARKS)**

- a) Explain in detail “the semiconductor “channel” of the Junction Field Effect Transistor”  
(6 Marks)
- b) Explain the relationship between alpha and beta  
(4 Marks)
- c) What is a feedback amplifier? Explain all the types of feedback, comment which one is better to use and why.  
(8 Marks)
- d) What is the significance of arrow in the transistor symbol?  
(2 Marks)

**QUESTION FOUR (20 MARKS)**

- a) What is op-amp? An operational amplifier?  
(2 Marks)
- b) With the help of diagrams explain all the modes of FET's.  
(12 Marks)
- c) With a diagram explain potential barrier  
(6 Marks)

**QUESTION FIVE (20 MARKS)**

- a) With neat diagrams explain the similarities and differences between NPN and PNP transistors with respect to their construction and applications.  
(10 Marks)
- b) What is the function of a transistor?  
(3 Marks)
- c) What is Moore's Law?  
(2 Marks)
- d) Why the input resistance of an op-amp is high whereas its output resistance is low?  
(3 Marks)
- e) Define and explain the meaning of the following terms;
  - i) Channel
  - ii) Drain  
(2 Marks)