

# MIDTERM EXAM

Subject: **Electronic Device and Circuit**  
**(C02015)**  
 Exam code: **01**

Duration: **45 minutes**  
 Reference: **No**

**Full Name:** \_\_\_\_\_ **ID:** \_\_\_\_\_

*Please submit this exam with your answers*

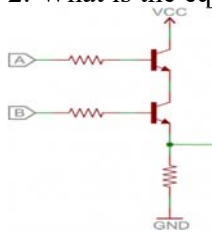
## PART 1: Multiple-choice (20 points)

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10

1. In case of Short Circuit, \_\_\_\_\_ current will flow in the circuit.

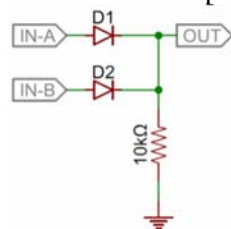
- a) Zero
- b) Very low
- c) Normal
- d) Infinite

2. What is the equivalent logic gate using two NPN transistors as follows?



- a) AND
- b) OR
- c) NOT
- d) All are not correct

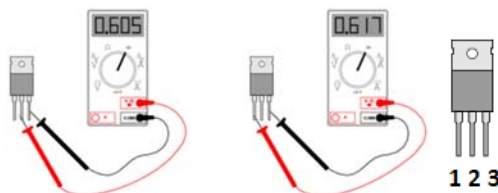
3. What is the equivalent logic gate using two diodes as follows?



- a) AND
- b) OR
- c) NOT
- d) All are not correct

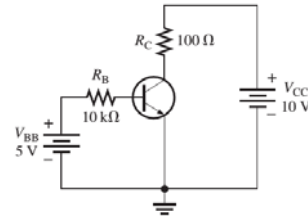
4. Following figure is the “diode checking” for an NPN transistor using a multi-meter. It is assumed that the pin of this transistor is 1, 2 and 3 (see the figure below). What is the Base pin?

- a) 1
- b) 2
- c) 3
- d) Cannot determine



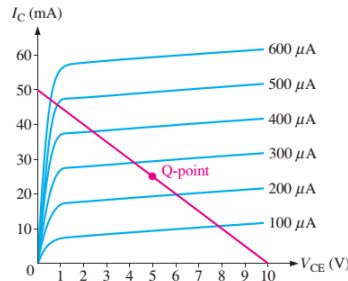
5. Considering a circuit with an NPN transistor as follows. When the voltage  $V_{BB}$  is increased slowly from 0V to 5V. The sequence mode of this transistor is:

- Cut-off, Amplifier and Saturation mode
- Cut-off, Saturation and Amplifier mode
- Amplifier, Saturation and Cut-off mode
- Saturation, Amplifier and Cut-off mode



6. Follows figure is the characteristics of NPN transistor. What is the approximate saturation current ( $I_{SAT}$ )?

- 500μA
- 400μA
- 60mA
- 50mA



7. When a transistor NPN working in saturation mode, the current  $I_C$  and  $I_B$  are 80mA and 10mA respectively, what is the beta ratio describing the amplifying power of the transistor?

- 8
- 80
- Less than 8
- All are wrong

8. The dc current through each diode in a bridge rectifier equals:

- half the dc load current
- twice the dc load current
- the load current
- one-fourth the dc load current

9. When there is a current across a diode (it is forward biased), the voltage across it

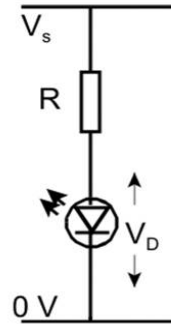
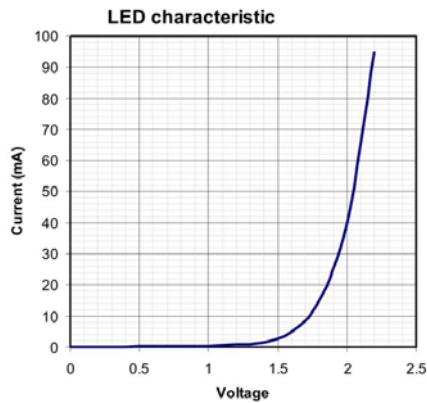
- is inversely proportional to the current
- is directly proportional to the current
- remains approximately the same
- is directly proportional to the source voltage

10. Testing a good diode with an ohmmeter should indicate

- high resistance when reverse biased (cursor stops) and low resistance (cursor moves) when forward biased
- low resistance when forward or reverse biased (cursor moves)
- high resistance when forward or reverse biased (cursor stops)
- high resistance when forward biased (cursor stops) and low resistance when reverse biased (cursor moves)

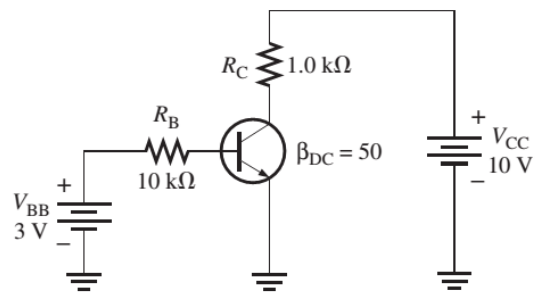
## PART II: ESSAY (80 points)

**Question 1 (30 points).** An LED which has the characteristics shown in this graph is to be used in the circuit below in which both  $V_s$  and  $R$  can be varied. For this LED the switch on voltage ( $V_D$ ) is 1.7 volt which produces a current of 10 mA at which point the LED will just glow dimly. Let us say that the LED operates brightly at 40 mA, but will fail if the current exceeds 90 mA for too long.



1. Initially the power supply is set at  $V_s = 6V$ . What value is required for the resistor so that the LED operates at 40 mA? (10 points)
2. If a current of 20 mA is flowing and the resistor is  $200 \Omega$ , what is the supply voltage? (10 points)
3. Find the minimum value of the resistor that could be used without damaging the LED (10 points)

**Question 2 (50 points):** For following NPN circuit ( $\beta_{DC} = 50$ ,  $V_{CE(Sat)} = 0.2V$ ):



Determine  $I_B$ ,  $I_C$  and  $I_E$  (25 points)

Determine  $V_{BE}$ ,  $V_{CE}$  and  $V_{CB}$  (25 points)

**Extra page!!!**

**Lecture**

**Examiner**

**Le Trong Nhan**