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**UNI VERSITY REGULAR EXAMINATIONS**

**2013/2014 ACADEMIC YEAR**

**SECOND YEAR SECOND SEMESTER EXAMINATIONS**

**FOR THE DEGREE**

**OF**

**BACHELOR OF SCIENCE (COMPUTER SCIENCE)**

**COURSE CODE:** CSC 220

**COURSE TITLE:** ELECTRONICS

**DATE:** 23<sup>RD</sup> APRIL, 2014

**TIME:** 9:00A.M.-12 NOON

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**INSTRUCTIONS**

Answer **QUESTION ONE** and attempt **ANY OTHERTWO** questions

## QUESTION ONE (COMPULSORY) – (30mks)

- a) Differentiate between the following terms:-
- i) Intrinsic and extrinsic semiconductors
  - ii) Donor and acceptor atoms (4mks)
- b) i) Using appropriate illustration explain three classification of materials in terms of energy levels. (3mks)
- ii) Using basic illustrations, describe the principle of operation of a photodiode. (2mks)
- c) (i) State two uses of a transistor
- (ii) Using transistor current relationship, derive the relationship between  $I_C$  and  $I_B$
  - (iii) Briefly describe three modes of connection of a transistor in a circuit.
  - (iv) Explain how a transistor is biased for amplification. (5mks)
- d) For the transistor circuit shown in figure 1d below, determine:-
- (i)  $I_E$
  - (ii)  $I_B$
  - (iii)  $I_C$
  - (iv)  $V_{CE}$  (4mks)

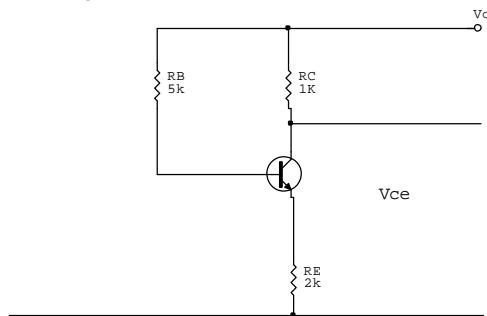


Figure 1d

- e) (i) State the difference between a triac and a diac (2mks)
- (ii) State two advantages of class B amplifier over class A amplifier (2mks)
  - (iii) Differentiate between small signal and large signal amplifiers (2mks)
- f) Explain the following terms as used in field effect transistors
- (i) Transconductance
  - (ii) Pinch-off voltage (2mks)
- g) State and explain four attributes of switched mode power supply (4mks)

## QUESTION TWO

- a) (i) Draw a circuit diagram of a common emitter transistor amplifier using capacitor coupling.
- (ii) State three methods of coupling in transistor amplifiers
  - (iii) A given transistor has  $\beta = 0.987$ . The transistor is connected with emitter grounded. If the collector current changed by  $0.6mA$ , calculate the change in base current. (10mks)
- b) (i) Explain the cut-off and saturation conditions of a transistor. (4mks)
- (ii) Draw the circuit diagram of a transformer coupled transistor amplifier and explain its frequency response. (6mks)

### QUESTION THREE

- (a) Explain the effect of negative feedback on the following in amplifier;
- Stability of amplifier again
  - Bandwidth (6mks)
- (b) Explain briefly how n- type and p- type materials are formed. (4mks)
- (c) Explain the following terms as applied to Zener diode;
- Zenervoltage
  - Leakage region (4mks)
- (d) With the aid of diagrams describe the movement of charge carriers in an NPN transistor when the collector junction is reversed- biased and the emitter junction is forward- biased. (6mks)

### QUESTION FOUR

- (a) (i) With the aid of diagrams, briefly explain the following;
- Forward biasing
  - Reverse biasing (4mks)
- (iii) Sketch the dc load line for the figure shown below (4mks)  
(Given  $V_{BE}=0.7$ ,  $\beta = 50$ )

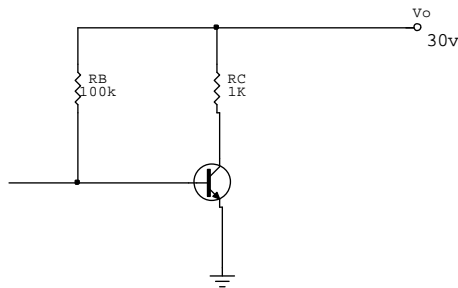


Figure 4a

- (iii) For the circuit shown in (ii) above find:-
- Base current,  $I_B$
  - Collector- emitter voltage,  $V_{CE}$  (4mks)
- (b) (i) For the Zener shunt regulator of figure 4(b), determine the load current, minimum and maximum zener current. (6mks)

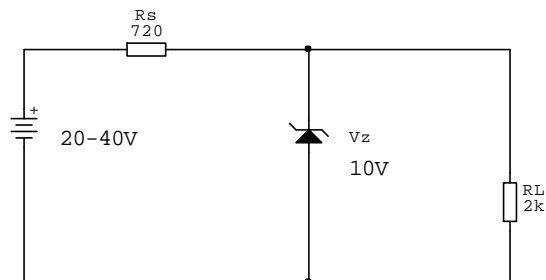


Figure 4b

(c) Name four types of thyristors.

(2mks)

### QUESTION FIVE

(a) Explain the following terms;

(i) Positive feedback.

(ii) Negative feedback.

(4mks)

(b) With the aid of diagrams, illustrate four types of feedback.

(4mks)

(c) A class A transformer coupled power amplifier has zero signal collector current of 50mA. If the collector supply voltage is 5V, find;

(i) The max ac power output.

(ii) The power rating of transistor

(iii) The max collector efficiency.

(6mks)

d) Using appropriate diagrams, explain the operation of an ordinary diode in full-wave rectification.

(4mks)

e) State two advantages of FETs over BJTs.

(2mks)