AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
2ND YEAR 1ST SEMESTER, FINAL EXAMINATION, SPRING-2017
COURSE NO.: EEE-2141 COURSE TITLE: ELECTRONIC DEVICES & CIRCUITS

TIME: 3 HRS **Use separate script for each part.** FULL MARKS: 210

SECTION-A

There are four (4) questions in this section. Answer any three (3)
Marks allotted for each question are indicated in the right margin

01

(a) What is an extrinsic semiconductor? Explain why a pentavalent impurity atom is known as donor-typed impurity. **[17]**

(b) Design a clamper circuit to perform the following operation of Fig. 1(b) with necessary equation. **[18]**

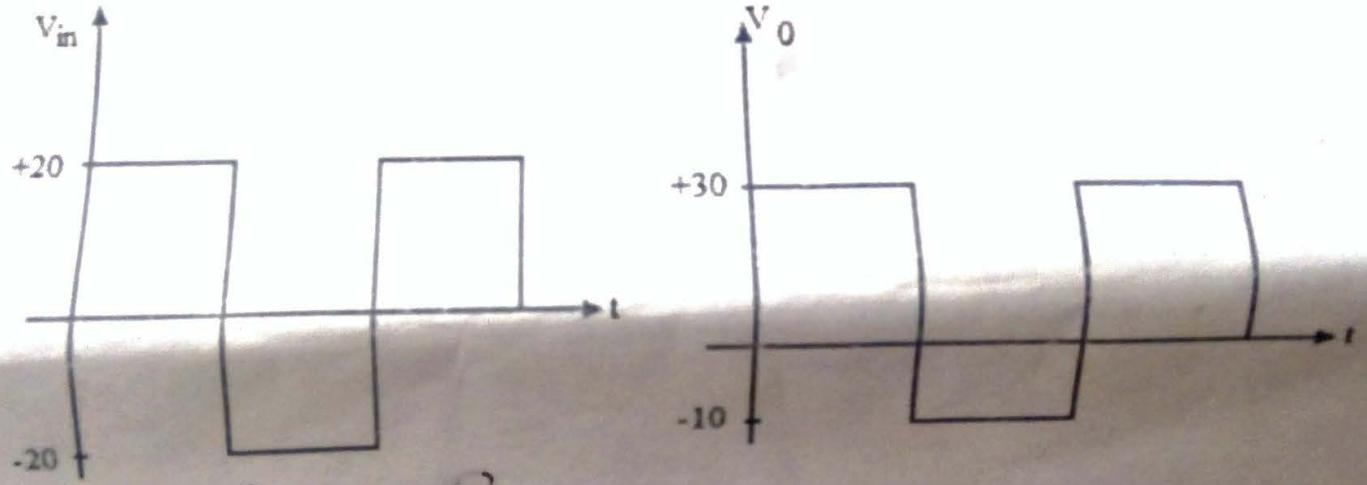

Fig.:1 (b)

02

(a) Using the small signal diode model show that, $i_d = \frac{I_D}{nV_T} v_d$, $r_d = \frac{nV_T}{I_D}$ where the symbols have their usual meaning. **[17]**

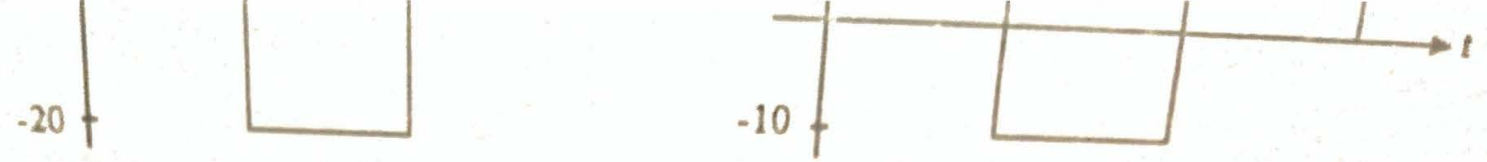

Fig.:1 (b)

02

(a) Using the small signal diode model show that, $i_d = \frac{I_D}{nV_T} v_d$, $r_d = \frac{nV_T}{I_D}$ where the symbols have their usuai meaning. [17]

(b) Find I_D and V_0 of the circuit shown in Fig.:2 (b). [18]

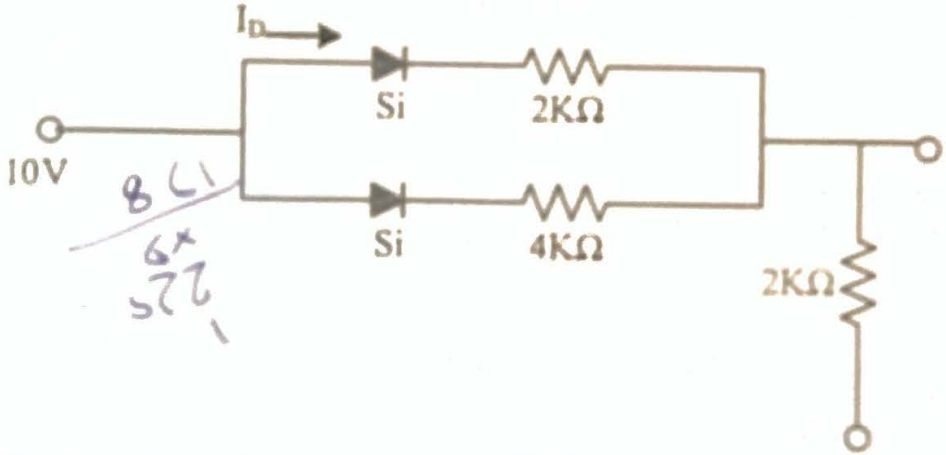

Fig.:2 (b)

(a) Draw the circuit diagram of a full wave rectifier with input and output wave shapes with bridge connection and explain its working principle. Also derive the expression of rectification efficiency in this case. [17]

(b) Draw the output wave shapes, V_0 of the circuit shown in Fig.: 3 (b) with necessary equations. [18]

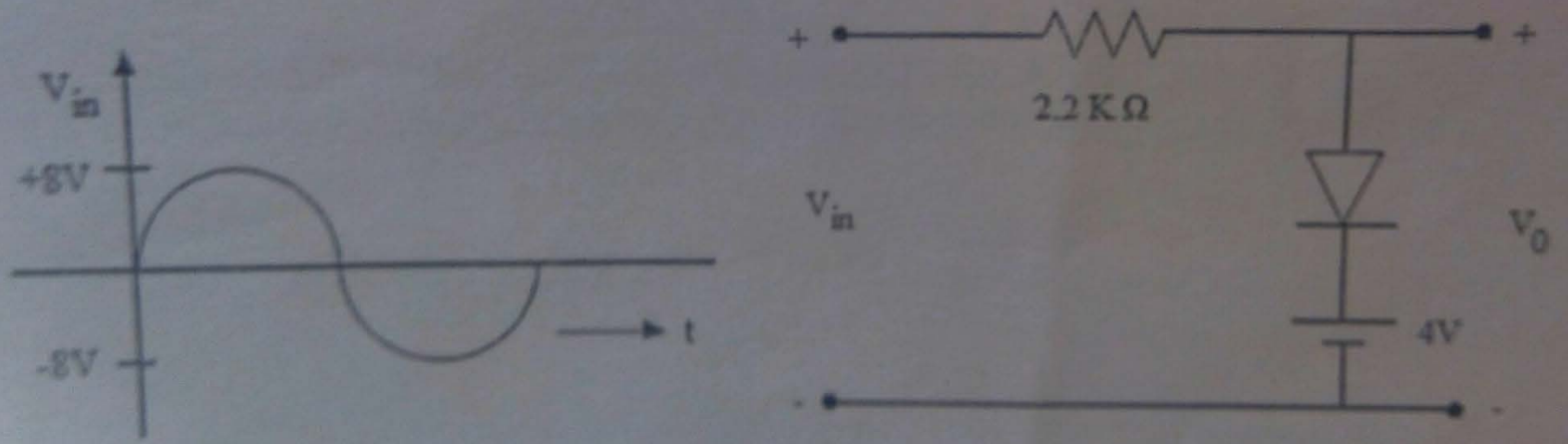

Fig.: 3 (b)

04 (a) In the circuit shown in Fig.: 4 (a), determine the range of R_L and I_L that will result [17]

Fig.: 3 (b)

Q4

(a) From the circuit shown in Fig.: 4 (a), determine the range of R_L and I_L that will result in V_{RL} being maintained at 10V. [17]

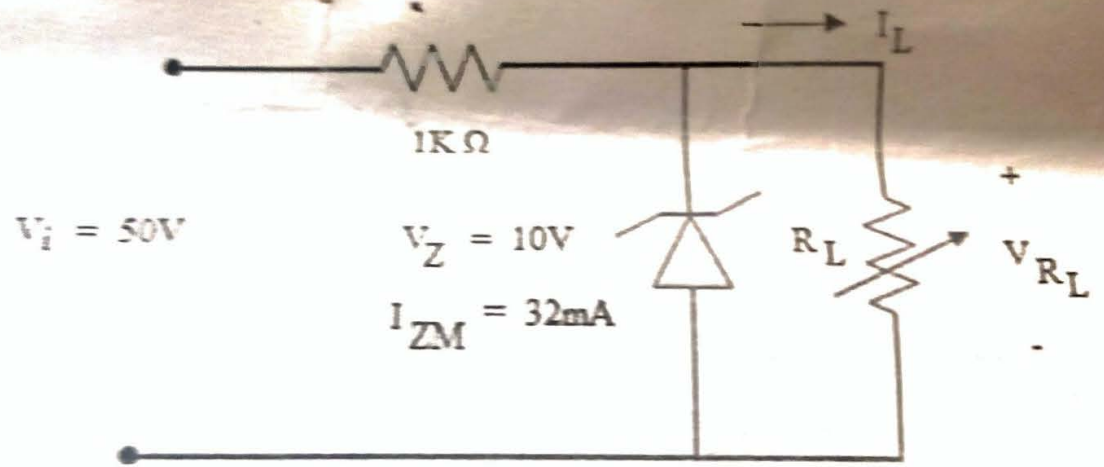

Fig.: 4 (a)

(b) Draw a NPN transistor in the CB configuration biased for operation in the active region. Also sketch typical CB input and output characteristic curve for an NPN transistor. Label all the variables. [18]

SECTION-B

There are four (4) questions in this section. Answer any three (3)
Marks allotted for each question are indicated in the right margin

05

(a) What is the difference between depletion type and enhancement type MOSFET. [17]
Describe the construction and operating principle of a N-channel depletion type MOSFET with input and output characteristics curves.

(b) Draw the output voltage waveform of the following comparator circuit of Fig. 5(b). [18

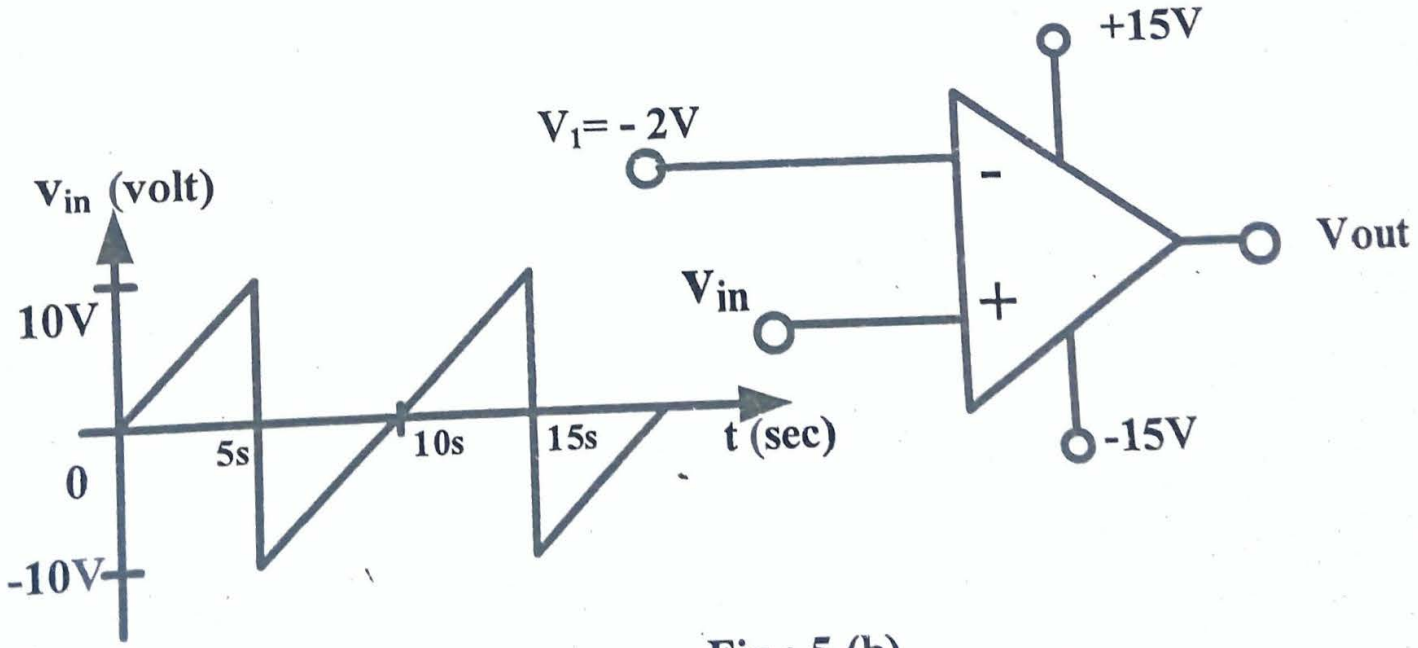

Fig.: 5 (b)

06

(a) Show that, $I_C = \beta I_B + I_{CEO}$, where the symbols have their usual meaning.

(b) For the circuit shown in Fig. 6 (b), find output voltages, V_1 and V_2.

Fig.: 5 (b)

06

(a) Show that, $I_C = \beta I_B + I_{CEO}$, where the symbols have their usual meaning. [17]

(b) For the circuit shown in Fig. 6 (b), find output voltages, V_1 and V_2. [18]

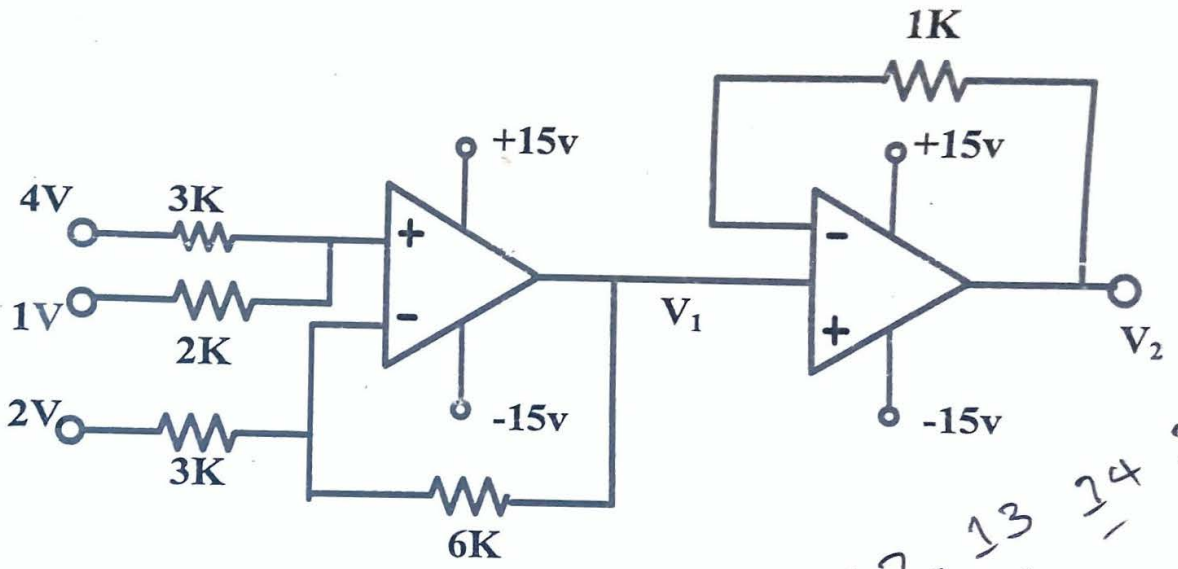

Fig.: 6 (b)

6.

(a) Explain the 741 amplifying action with relevant figure. [5]

(b) A voltage divider bias circuit is shown in the Fig 7.6. Determine the operating point. [10]
Assume $\beta_{ac} = 0$,

07

(a) Explain BJT amplifying action with relevant figures. [17]

(b) A voltage divider bias circuit is shown in the Fig.7 (b). Determine the operating point. [18]
Assume $V_{BE} = 0.7V$

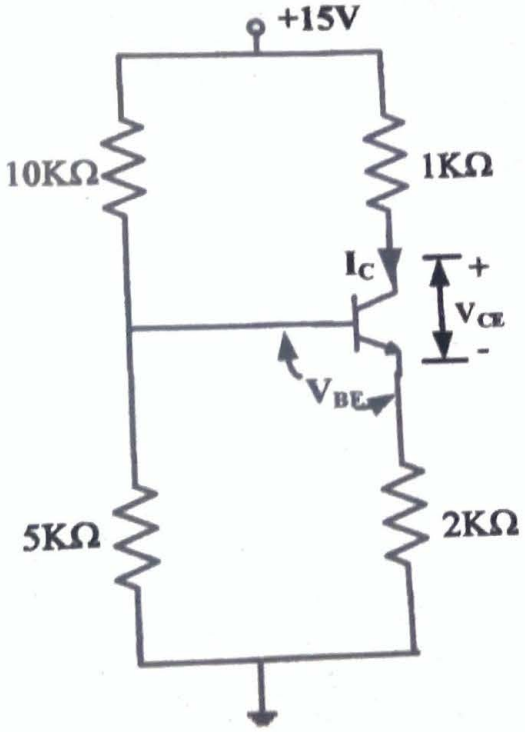

Fig.: 7(b)

β = 98

[17]

08

08

(a) Write short notes on:

i. Controlled full wave rectifier.

ii. Pinch-off voltage of a MOSFET and

iii. Ion implantation of IC fabrication.

(b) The emitter-bias configuration of Fig. 8 (b) has the following specifications: $I_{CQ} = \frac{1}{2} I_{Csat}$, $I_{Csat} = 8mA$, $V_C = 18$ V and $\beta = 110$. Determine R_C, R_E, and R_B.

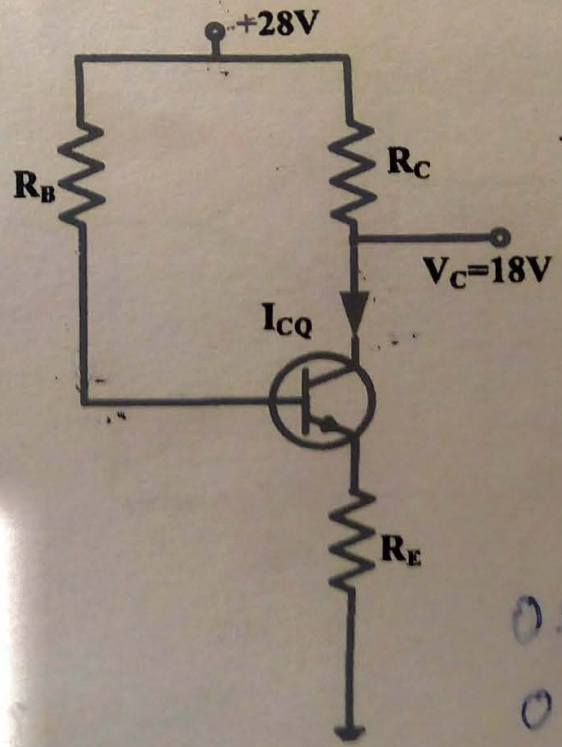

Fig.: 8 (b)