Total Number of Pages: 04

1st Semester Back Examination 2016-17
BASICS OF ELECTRONICS
BRANCH: ALL
Time: 3 Hours
Max Marks: 100
Q.CODE: Y514

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

### Part – A (Answer all the questions)

Q1   **Answer the following questions**: *multiple type*   **(2 x 10)**

a) The period of signal $x(t) = 15 + 40\cos 80\pi t$ is
   (a) 1/40 sec.
   (b) 1/80 sec.
   (c) 40π sec.
   (d) 80π sec.

b) In a LED, the light emission occurs because
   (a) light gets reflected due to lens action
   (b) light falling on the diode gets amplified
   (c) diode gets heated up
   (d) recombination of charge carriers takes place

c) If V_m is the peak voltage across the secondary of a transformer in a half wave rectifier (without filter circuit), then the maximum voltage on the reverse biased diode is
   (a) V_m
   (b) $2 V_m$
   (c) $0.5 V_m$
   (d) $4 V_m$

d) Compare to a CB amplifier, the CE amplifier has
   (a) lower input resistance
   (b) higher output resistance
   (c) lower current amplification factor
   (d) higher current amplification factor

e) An ideal Op-amp is an ideal
   (a) voltage controlled current source
   (b) voltage controlled voltage source
   (c) current controlled current source
   (d) current controlled voltage source

f) In a negative feedback amplifier using voltage-series feedback, the input resistance (R_{if}) and output resistance (R_{of}) with feedback
    (a) increases and decreases respectively
    (b) increases and increases respectively
    (c) decreases and increases respectively
    (d) decreases and decreases respectively

g) Given that $(125)_R = (203)_5$. The value of R is
    (a) 10
    (b) 8
    (c) 6
    (d) 16

h) The range of signed decimal number that can be represented by 6 bit 1's compliment number is
    (a) -64 to +63
    (b) -63 to +64
    (c) -64 to +64
    (d) -63 to +63

i) The early effect in a bipolar junction transistor is caused by
    (a) large emitter-base reverse bias
    (b) large collector-base reverse bias
    (c) fast turn-on
    (d) fast turn-off

j) In a CRO the time base signal is applied to
    (a) Vertical plate
    (b) Horizontal plate
    (c) Either vertical or horizontal plate
    (d) Both horizontal and vertical plate

Q2   **Answer the following questions: *Short answer type***   **(2 x 10)**

a) What do you mean by frequency spectrum of a signal? Draw the frequency spectrum of a square wave.

b) Perform the following subtraction using 2's compliment method
$(19)_{10} - (27)_{10}$

c) Find the small signal ac resistance of a forward bias diode having forward dc current of 2.5mA at room temperature.

d) A Lissajous pattern on a CRO has five horizontal tangencies and two vertical tangencies. The frequency of the horizontal input waveform is 2 KHz. Find the frequency of the vertical input waveform.

e) Implement the following logic function using NAND gates only
$F = \overline{X} + YZ$

f) Define CMRR of an op-amp. Mention its significance.

g) What do you mean by thermal runaway of a transistor?

h)
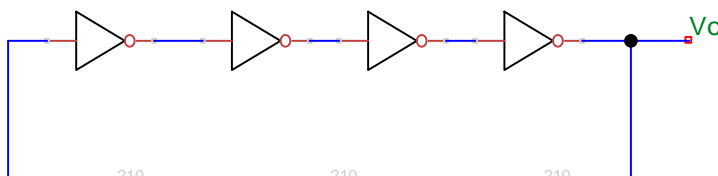
The propagation delay of each inverter is 100µs. find the fundamental frequency of the oscillator output Vo.

**i)**

15V

Si D   Si D

Vo

2.2K

-5V
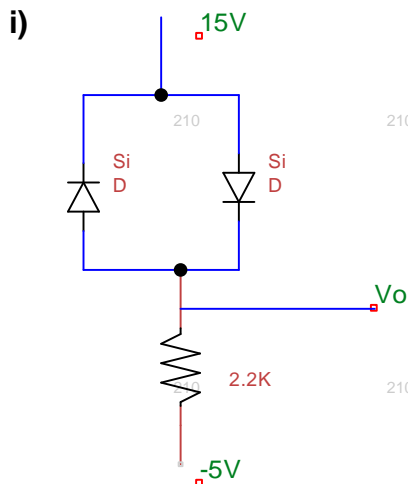
Determine Vo for the above circuit.

j) Mention the conditions that must be fulfilled for sustained oscillation.

## Part – B (Answer any four questions)

Q3 a) Draw the circuit diagram of a full wave bridge type rectifier using diode and explain its operation. Derive the expressions for rectification efficiency and ripple factor, form factor and the transformer utilization factor.   **(10)**

b)   **(5)**

Vi

R = 1K

Vz = 24 V

Pmax = 400 mW

0.22 K

Vo

0
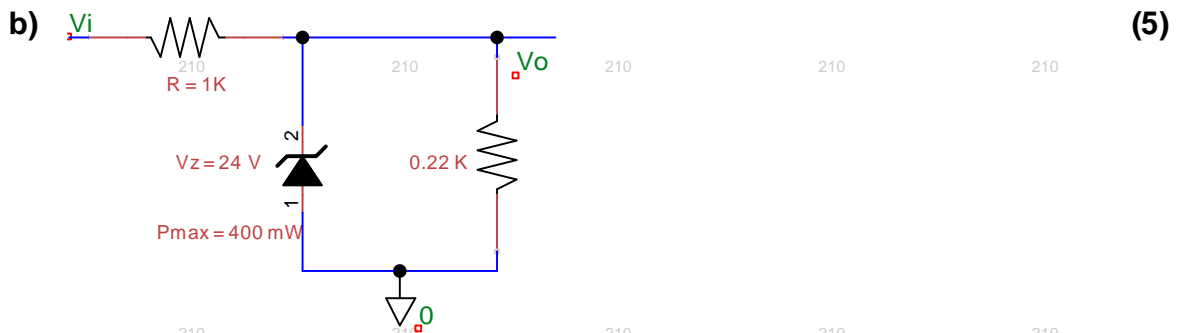
Determine the range of Vi that will maintain Vo at 24 volt without exceeding the power rating of the zener diode.

Q4 a) What is the need of biasing in a transistor amplifier? Draw and explain the circuit of a voltage divider bias CE amplifier. Derive the expression for the stability factor due to I_{CO} for this configuration.   **(10)**

b) **(5)**
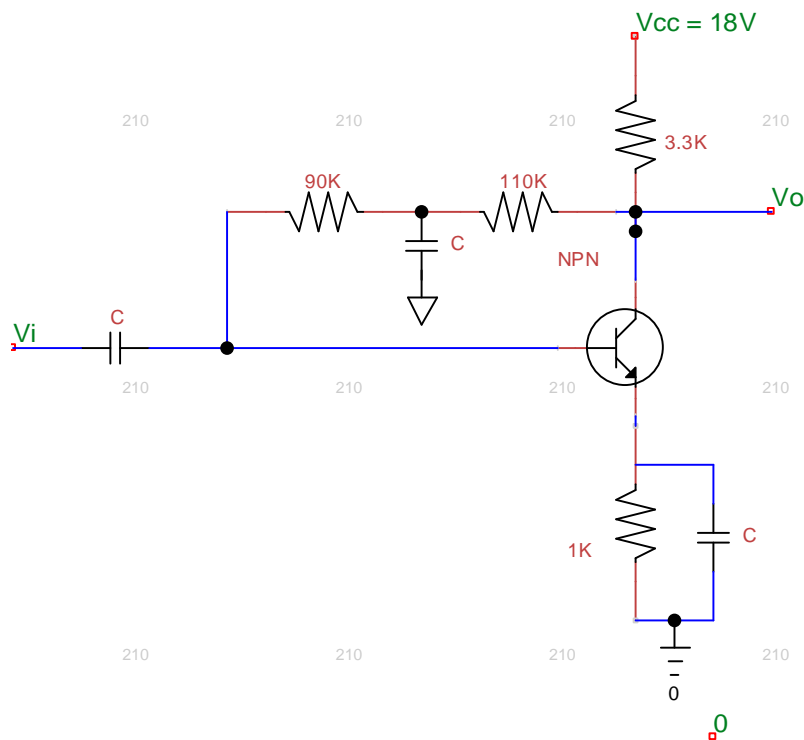
Determine the Q point for the configuration shown in the figure. Assume the β of the transistor as 75 and capacitors are 10 µf.

Q5 a) Implement a full adder circuit using two 4:1 multiplexors. **(10)**

b) State and prove DeMorgan's theorem of Boolean algrbra. **(5)**

Q6 a) Draw and explain the circuit of a Wien bridge oscillator. Derive an expression for the frequency of oscillation for this oscillator. **(10)**

b) The distortion in an amplifier is found to be 2% when the feedback factor of a negative a feedback amplifier is 0.04. When the feedback is removed, the distortion becomes 10%. Find the open loop gain and closed loop gain of the amplifier. **(5)**

Q7 a) Draw the circuit of a basic differentiator and explain its operation. What are the limitations of this circuit and how these are overcome in practical differentiator circuit? **(10)**

b) IC 741 is used as an inverting amplifier with a gain of 100. The frequency response plot is flat up to 10 KHz. Determine the maximum peak to peak signal that can be applied without distortion to the output. **(5)**

Q8 a) With the help of block diagram showing essential components explain the working of CRO. **(10)**

b) What is Lissajous method? Does it require sweep signal? How is Lissajous pattern useful in frequency and phase measurement of a signal **(5)**

Q9 a) Draw the circuit of an emitter follower. Derive the expression for input impedance, output impedance and the voltage gain. **(10)**

b) Differentiate between static and dynamic RAM. **(5)**