Registration No. : | | | | | | | | | | |

Total number of printed pages – 7

B. Tech.

BE 2101(N) / BENG 1105(O)

First Semester Examination – 2010

BASIC ELECTRONICS

(New and Old Course)

Full Marks – 70

Time : 3 Hours

(Students are required to give their answer any one Course according to the Syllabus)

(NEW COURSE)

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions: 2×10

   (a) What do you mean by frequency spectrum ? Calculate the frequency and time period of the following sinusoidal signal.

   $f(t) = 5 \sin (500t)$

   (b) What is Avalanche breakdown ?

   (c) What is significance of Virtual ground in an Op-Amp ?

   (d) Why is meant by small signal analysis of transistor?

   (e) What is Barkhausen criterion?

   (f) How a waveform is displayed in a Cathode Ray Oscilloscope?

   (g) Why Biasing is done in a Bipolar Junction transistor ?

P.T.O.

(h) Write the Truth table for a 3-input Ex-OR logic gate.

(i) Convert the decimal number $(201.32)_{10}$ into its equivalent Binary number.

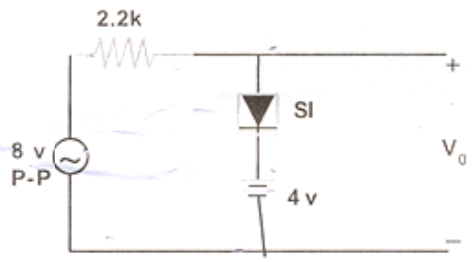
(j) A Lissajous pattern on a CRO has 4 horizontal tangencies and 2 vertical tangencies. The frequency of horizontal input is 1 KHz. What is the frequency of the vertical input?

2. (a) Explain the operation of a P-N Junction diode with V-I characteristics. 5

(b) Explain how the Op-Amp can be used as a summing amplifier with a neat circuit diagram. 5

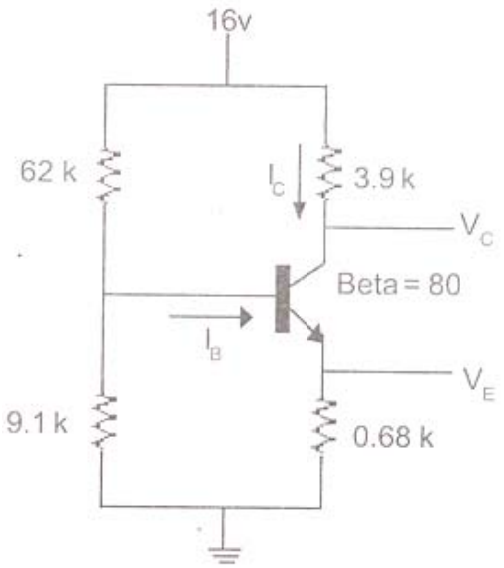
3. (a) How the transistor can be used as an amplifier in CE configuration. Explain with proper diagrams. 6

(b) Determine the output voltage V_0 and its wave form for the following network. 4



4. (a) Explain the operation of a full wave rectifier with input –output waveforms. 4

(b) Calculate I_{cq}, V_{ceq}, V_C, V_E for the following BJT biasing circuit. 6



5 (a) Draw the Block diagram of Function Generator and explain its operation. 5

(b) What are the advantages of negative feedback? Explain the operation of Op-Amp phase shift Oscillator. 5

6. (a) Simplify the following Boolean expression and realize it using only NAND gate 5

ABC [AB + C′ (BC +AC)]

(b) Convert the following SOP expression into its standard POS form and write its truth table. 5

A B′C + A′B′ + AB C′ D

7 (a) Explain the operation of a full adder with its truth table and logic circuit. 7

(b) Write and prove Demorgan's theorm. 3

8 (a) Classify different types of RAM's. Explain the operation of SRAM. 5

(b) Explain the operation of S-R Latch in detail. 5

(OLD COURSE)

Answer Question No. ***1*** *which is compulsory and any* ***five*** *from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions: 2×10

   (a) Define Mobility and Conductivity.

   (b) What is the difference between Avalanche breakdown and Zener breakdown? Which is used in voltage regulator application?

   (c) What do you mean by frequency spectrum? Calculate the frequency and time period of the following sinusoidal signal.

   $f(t) = 5 \sin (300t)$

   (d) What is meant by small signal analysis of a transistor?

   (e) Explain how enhancement type MOSFET is different from depletion type MOSFET.

   (f) Define CMRR. If the CMRR of an Op-Amp is 80dB and the common mode gain is −0.5, what is the differential mode gain of the Op-Amp?

   (g) What is modulation index? How it affects the performance of an AM communication system?

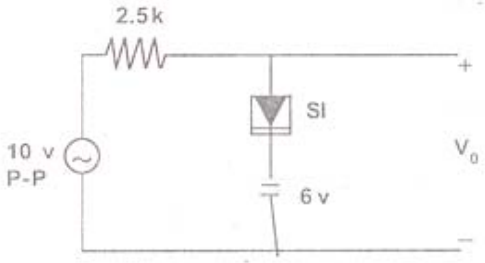
   (h) What is quantization?

   (i) Convert the Hexadecimal number $(2AB.32)_{16}$ into its equivalent Binary number.

   (j) Why Time base is used in a Cathode Ray Oscilloscope?

2. (a) How a P-type semiconductor is formed? Explain the operation of a P-N junction under forward and reverse bias condition. 5

(b) Determine the output voltage V_0 and its wave form for the following circuit. 5

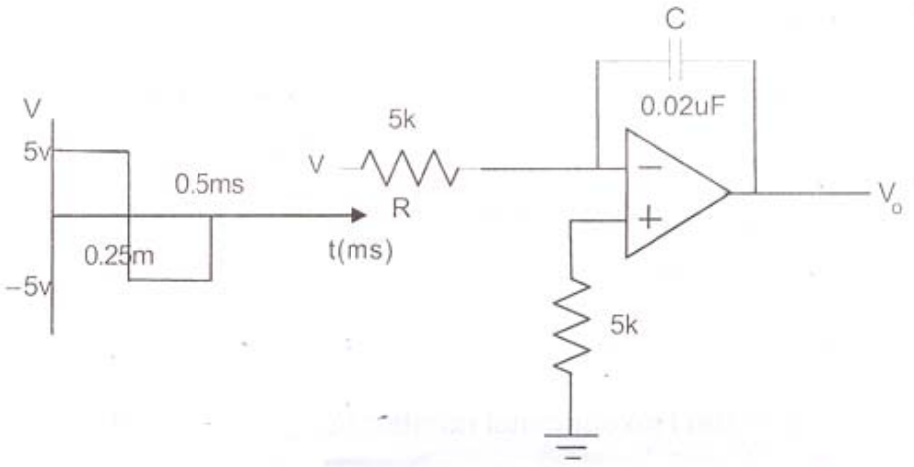


3. (a) Explain how transistor is used an amplifier in CE configuration. 5

(b) Explain the DC analysis of Depletion type MOsSFET's. 5

4. (a) Draw the CMOS- common source amplifier and explain its operation. 5

(b) Sketch the output waveform of the following circuit for the given input waveform. 5



5 (a) Discuss different types of Feedbacks and write the advantages of negative Feedback. 5

(b) Simplify the following Boolean expression and draw its logic circuit. 5

A′BC + AB′C′ + A′B′C′ + AB′C + ABC

6. (a) Design a combinational logic circuit which adds three binary bits and implement using NAND gates. 6

(b) An AM transmitter radiates 10kW with an unmodulated carrier and 15kW when it is amplitude modulated. Calculate the percentage of modulation. 4

7 (a) Explain the advantages of Fiber optic communication system over other modes of communication. 5

(b) Describe the operation of S-R and J-K flip-flops. 5

8 Write short notes on any *two* of the following : 5×2

(a) Digital Multimeter

(b) Digital Modulation

(c) Displaying a waveform in CRO.