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Total number of printed pages – 3

B. Tech
BE 2101

First Semester Examination – 2013

BASIC ELECTRONICS

QUESTION CODE : C- 613

Full Marks – 70

Time : 3 Hours

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 is the significance of virtual ground of an OPAMP ?
 - (b) An ideal $p-n$ junction act as a bistable switch. Justify.
 - (c) How the emitter bi-pass capacitor in a CE amplifier prevents signal degeneration ?
 - (d) Why a fixed bias is called so ? Justify.
 - (e) Give the load line of a BJT amplifier if $V_{CC} = +18V$ and $R_C = 1.5 K\Omega$.
 - (f) Realize an EX-OR gate using NOR gate.
 - (g) What is de-Morgan's law ?
 - (h) What is the radix of a number in number system ? Convert $(11010010)_2$ into hexadecimal system.
 - (i) What is a time base voltage ? Why the time base voltage is generally given to X plate of a CRO ?



P.T.O.

(j) What will happen when the time period of clock signal is greater than propagation time of the clocked flip-flop ?

2. A full-wave bridge rectifier with a 120 V rms sinusoidal input has a load resistor of 1 k Ω .

(a) If silicon diodes are applied, what is the d.c. voltage available at the load ?

(b) Determine required PIV rating of each diode.

(c) Find maximum current through each diode during conduction.

(d) What is required power rating of each diode ? 10

3. (a) Draw the circuit of an emitter follower. Derive the expression for input impedance. Mention at least two application of an emitter follower. 5

(b) Define I_{CBO} and I_{CEO} . Derive an expression to find the relation among them. 5

4. (a) A CE amplifier has mid band frequency gain of 200. The upper and lower 3dB frequency of the amplifier is 10 kHz and 100 Hz respectively. A negative feedback of 10% is incorporated in the amplifier circuit. Find the new gain and new bandwidth after feedback. 5

(b) Explain the basic principle of a sinusoidal oscillator. What are the basic requirements for self-sustained oscillations ? 5

5. (a) Draw and explain an OPAMP based differentiator. Find its transfer function. Draw its output in response to a square wave input. 5

(b) What are the ideal characteristics of electronic measuring instruments ? Explain CRO as voltmeter. 5

6. (a) What is MUX ? Implement the following Boolean function using 4 \times 1 MUX. 5

$$F = A'B'C' + ABC + AB'C + A'BC'$$

- (b) Simplify the following function using Boolean algebra identity. 5

$$F(A, B, C, D) = \sum m(4, 5, 6, 7, 12, 13, 14).$$

And then, write the simplified functions in POS and SOP form

7. (a) Explain half-adder and full adder logic circuit. Then, implement a full-adder with half-adder and OR gates. 5

- b) What is a binary counter ? Design binary counter circuit using flip-flops which will count three bit binary sequence. 5

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

- (a) RS Flip-flops
(b) Inverters using C-MOS
(c) DC biasing of transistors
(d) Static and dynamic RAMs.

