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

Total number of printed pages – 3

B. Tech
BE 2101

First Semester Regular Examination – 2014

BASIC ELECTRONICS

BRANCH : B. TECH

QUESTION CODE : H 455

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 dynamic resistance (R_d) of a diode? How R_d is related with diode forward current ?

(b) Can a transistor be used as clipper circuit ? Justify.

(c) What is bandwidth of an amplifier ? How bandwidth of an amplifier can be increased ?

(d) Mention the basic four basic sections of an operational amplifier circuits.

(e) Mention two conditions that must be fulfilled for self sustained oscillation.

(f) What should be the input impedance of an electronics instrument for measuring voltage ? Justify.

(g) The time base voltage of a CRO is given to Y axis and the sinusoidal voltage to be measured is given to X axis. Explain the problems associated with such measurement.

(h) What should be the radix of the numbers used in the following addition ?

34 + 15 = 50

P.T.O.

(i) What is the difference between combinational and sequential circuits ?

(j) Draw the block diagram of a 8 × 1 MUX.

2. A sinusoidal signal V(t) = 100 Sin (314t) is given to the input of a full wave bridge rectifier with a load resistor of 1.5 k Ω.

Determine

(A) The DC output voltage available at the load if silicon diodes are used.

(B) Determine required PIV rating of each diode

(C) the output ripple frequency

(D) AC input and output power and efficiency 10

3. (a) With a neat block diagram explain the principle of a time base generator used in CRO. 5

(b) With a neat block diagram explain the principle of a function generator. 5

4. (a) (i) What happens when peak amplitude of the signal is greater than DC Biasing voltage of transistor ? Explain with necessary diagram. 3

(ii) Draw a transistor amplifier circuit used as switch and explain. 3

(b) Derive the voltage gain, input impedance of a CE transistor amplifier. Use simplified hybrid model. 4

5. (a) What is a Differentiator circuit ? Draw and find the transfer function of OPAMP based Differentiator circuit. Also draw the output wave form when a 2V peak to peak square wave voltage is given. 5

(b) How bandwidth, gain and distortion changes when a –ve feed back is used in the amplifier circuits ? 5

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

$$F = A'B'C' + ABC + AB'C + A'BC'$$ 5

(b) Implement the following function using NOR gate only.

$$F(A,B,C,D) = (A + C)(B + D).$$ 5

7. (a) Establish the following identities of Boolean algebra :

(1) $A + AB = A$

(2) $(A + B)(A + C) = A + BC$ 5

(b) (i) Perform the following subtraction using 1's and 2's complement method

$(51)_{10} - (17)_{10}$ 3

(ii) Justify, which method is best suitable for digital circuit implementation. 2

8. Write short notes on any two : 5 × 2

(a) Demultiplexers

(b) RC phase shift oscillator

(c) Diode as Clipper

(d) Instrumentation amplifier.