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

Total number of printed pages – 3

B. Tech
BE 2101

Second Semester Back Examination – 2015

BASIC ELECTRONICS

BRANCH(S) : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, EC, EEE, EIE, ELECTRICAL, ETC, FASHION, FAT, IEE, IT, MANUFACT, MANUTECH, MECH, MINERAL, MINING, MM, MME, PLASTIC, TEXTILE

QUESTION CODE : M 289

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) Draw the equivalent circuit of a transistor using diode.

   (b) What is the need of DC biasing of transistor ?

   (c) What are the three states of the tristate logic gate ? What is its importance ?

   (d) What is a time base voltage ? What is the need of time-base voltage in CRO ?

   (e) How gain of an amplifier can be increased without changing the component values of the amplifier ?

   (f) Perform the following subtraction using 2's compliment method :

   $(17)_{16} - (26)_{10}$

   (g) Construct a EX-OR gate using NAND gate only.

   (h) Draw the block diagram of 4X1 MUX. Why it is called a data selector ?

P.T.O.

(i) Mention two conditions that must be fulfilled in oscillator circuits.

(j) What is CMRR ? What are the disadvantages of an OPAMP with low CMRR value ?

2. Express the necessary derivation for the efficiency of a half wave silicon diode rectifier. If a 100 Ω load resistance is connected across a half wave rectifier. The input supply voltage is 230 V (rms) at 50 Hz, then find ripple factor and efficiency of the circuit. 5+5

3. (a) What are the characteristics of an ideal electronics voltmeter ? Explain with suitable diagram, how loading error can be minimized during measurement with voltmeter. 5

(b) With suitable block diagram explain the basic principle of a triangular wave generator. 5

4. (a) What is emitter follower circuit ? With a neat diagram explain transistor based emitter follower circuit. Mention its importance in electronics circuits. 5

(b) In the Fig.1, if $R_1 = 470\ K\Omega$, $R_2 = 270\ k\Omega$, $R_c = 6.2\ K\Omega$, $R_E = 1.5\ K\Omega$, $C_{in} = C_o = 10\ \mu F$, $C_b = C_E = 5\ \mu F$, then find V_c, V_E, I_C, and V_{CE} when $\beta = 100$ and $V_i = 0V$ 5

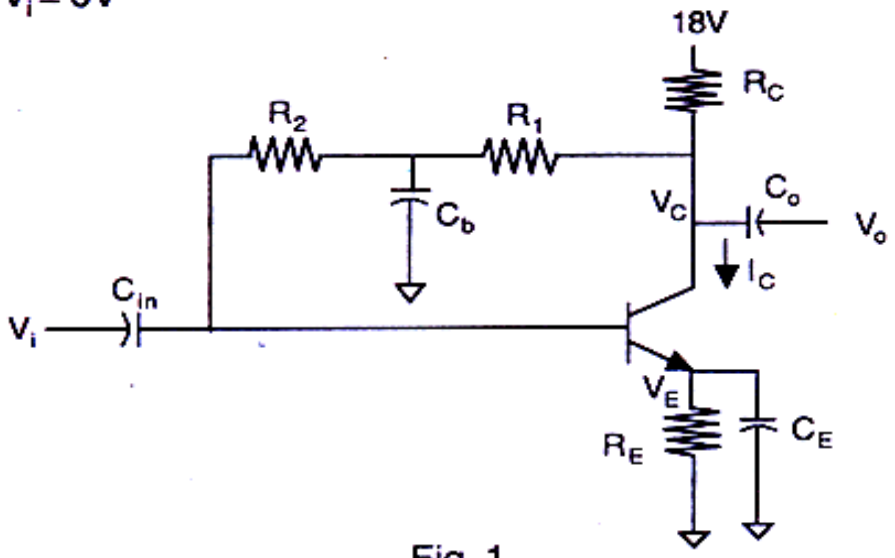

Fig. 1

5. (a) What is MUX ? Design the following Boolean function using MUX. 5

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

(b) What is POS in Boolean expressions ? Implement the following function in POS. 1+4

$$F(A, B, C) = (AB + C)(B + AC).$$

6. (a) Simplify the following Boolean function using Boolean algebra identities. 5

$F(A, B, C, D) = \sum m(0, 2, 4, 7, 8, 9)$.

And then, realize the simplified functions using logic gates.

(b) Explain the principle of an oscillator circuit. Mention the requirements to be filled up to built a oscillator circuit. 5

7. (a) What is an integrator circuit ? Draw and find the transfer function of OPAMP based integrator circuit. Also draw the output wave form when a 4 V peak to peak square wave voltage is given. 5

(b) The open loop gain of an amplifier changes by 5 percents. If 10 dB negative feedback is applied, calculate percentage change of the closed loop gain. 5

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

(a) Full adder

(b) Universal logic gates

(c) ROM and RAM

(d) DC biasing.