[This question paper contains 3 printed pages.]

1938 *Your Roll No. .....*

B.Sc. Prog./II **E**

EL-201 – ANALOG AND DIGITAL CIRCUITS

(NC – Admissions of 2005 and onwards)

Time : 3 Hours *Maximum Marks : 75*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all.

1. (a) State and prove Superposition Theorem (6)

   (b) Explain Kirchoff's voltage and current law (4)

   (c) Explain h parameters of a two port network? (5)

2. (a) Compare the working of a half wave and full wave rectifier using their circuits and output waveforms. Calculate the ripple factor of a full wave rectifier. (10)

   (b) Calculate the ripple factor when a shunt (capacitor) filter is used in a full wave rectifier. (5)

P.T.O.

3. (a) Draw the circuit diagrams of a transistor used in common emitter, common base and common collector configurations. Also draw the input and output characteristics of a common base configuration. (10)

(b) What is the DC load line of a transistor? Explain the terms cut-off, saturation Q – point with the help of it. (5)

4. (a) Find x in the following:

(i) $(1101\ 1010)_2 = (x)_{16}$

(ii) $(CAFE)_{16} = (x)_2$

(iii) $(45.75)_{10} = (x)_8$

(iv) Write Gray code of $(1111\ 1101)_2$

(v) Write BCD code for $(1234)_{10}$ (2×5)

(b) What are universal gates? Draw the circuit of XOR gate using only NAND gates and write its truth table. (5)

5. (a) Simplify the following expressions using Boolean Algebra Theorems:

(i) $Y = AB + A\,(B + C) + B\,(B + C)$

(ii) $Y = [A\bar{B}\ (C + BD) + \bar{A}\bar{B}]C$ (6)

(b) Draw a 4 bit serial in-serial shift register and explain shifting of the data 1010 by sketching its timing diagram. (9)

6. (a) Distinguish between RTL and DTL logic families. Describe basic characteristics of CMOS family. (10)

(b) Explain the terms fan-in and fan-out. (5)

7. (a) Draw the circuit diagram of a decade (MOD-10) counter. Explain its working using its truth table and timing diagram. (10)

(b) What is race-around condition in J K flip-flop? (5)

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

(a) Clamper

(b) Full Subtractor

(c) Ripple Counter (asynchronous)

(d) Zener Diode (7½×2)

(100)