This question paper contains 5 printed pages.]

8537   *Your Roll No. ....*

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 any five questions.
All questions carry equal marks.

1. (a) State and prove Thevenin's Theorem.

6

   (b) Prove Thevenin's theorem for a network having
        more than two generators.

4

   (c) $V_1 = 10$ V, $V_2 = 15$ V, $R_1 = 4\Omega$, $R_2 = 6\Omega$ in the circuit of
        fig. 1. Find the Thevenin's equivalent for the network
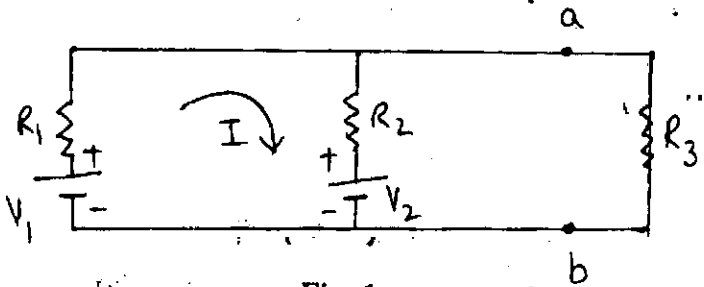   to the left of terminals a, b.

5

Fig.-1

2. (a) With the help of a neat circuit diagram explain the working of Bridge rectifier.

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(b) Define ripple factor. Derive the expression $\sqrt{(I_{rms}/I_{dc})^2-1}$ for ripple factor.

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(c) Find and compare the values of ripple factor of half wave and full wave rectifiers.

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3. (a) Give the hybrid equivalent circuit for a CE transistor amplifier.

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(b) Derive the expression for the current gain, voltage gain, input impedance and output admittance of a CE amplifier using hybrid model for an ideal voltage source.

12

4. (a) Explain with circuit diagram the operation of class B push-pull amplifier. Obtain an expression for the maximum efficiency of the circuit.
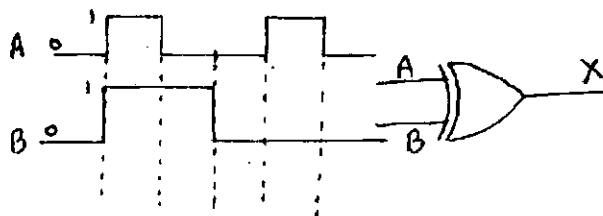
6, 6

(b) Give the advantages of a push-pull amplifier.

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5. (a) Convert Gray code 11111 to binary equivalent.

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(b) What would the output train look like for the following circuit :

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(c) Solve for x (i) $(EA)_{16} = (x)_2$
(ii) $(2DB)_{16} = (x)_{10}$
(iii) $(63)_{10} = (x)_8$

6

(d) Applying laws of Boolean Algebra, show that
$\overline{\overline{AB}} + \overline{A} + AB = 0$

2

(e) Reduce the Boolean expression

$\overline{A} B C + \overline{A} B \overline{C} + A \overline{B} C + A B C$

2

6. (a) Simplify the following Boolean function by means of four variable K-Map.

$F(A, B, C, D) = \Sigma m(2, 3, 4, 5, 6, 7, 11, 14, 15)$

and draw its logic circuit diagram using NAND gates.

8

(b) What is an Encoder? Explain the construction and working of a simple decimal to BCD encoder.

7

7. (a) Differentiate between Synchronous and Asynchronous counters. What are the advantages of Synchronous counters ?

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(b) Draw the circuit diagram of Decade Counter using J-K flip-flop and explain its working.

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(c) Draw the circuit diagram of RS latch using NOR gates and explain race condition.

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(d) An 8-MHz square wave clocks a 5-bit ripple counter. What is the frequency of the last FF?

2

8. (a) Draw the circuit diagram of a simple diode ROM and explain its working.

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(b) Why is floating TTL input equivalent to a high input?

5

(c) Give the logic circuit (using gates) of a full adder that can add three bits and write down the expression for SUM and CARRY.

5