

[This question paper contains 4 printed pages.]

4630

Your Roll No. ....

B.Sc. Prog./II

AS

EL-201 – ANALOG AND DIGITAL CIRCUITS

(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) Apply Thevenin's theorem to find current through the  $12\Omega$  resistor of the circuit shown below:

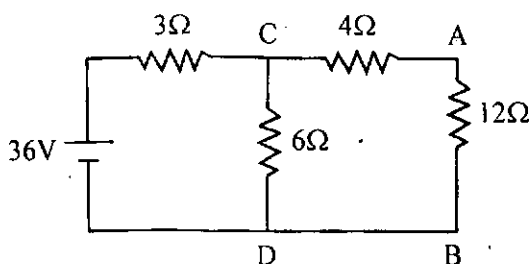


Fig. 1 (5)

- (c) Develop an equivalent circuit for a two port network in terms of h-parameters. (4)

P.T.O.

2. (a) With a neat diagram explain the working of a centre-tapped full-wave rectifier. (4)
- (b) Define ripple factor and power conversion efficiency. Derive the value of ripple factor for a full-wave rectifier. (6)
- (c) Explain how an inductor filter works. Derive an expression for the ripple factor of a full wave rectifier using an inductor filter. (5)
3. (a) Draw the characteristics of a transistor under the CE configuration and mark the active, saturation and cut off regions. (4)
- (b) Give the hybrid equivalent circuit for a CE transistor amplifier. (3)
- (c) Derive the expressions for the current gain, voltage gain, input impedance and output admittance of a CE amplifier using small signal hybrid model for an ideal voltage source. (8)
4. (a) Distinguish between class A, class B and class C amplifiers. (3)
- (b) Give the principle and working of a class B push-pull amplifier. Obtain an expression for the maximum efficiency of a class B push-pull amplifier. (6,6)

5. (a) What would the output pulse train look like for the following figure.

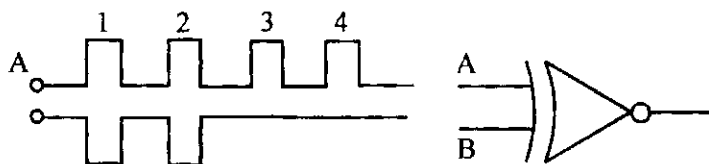


Fig. 2

(3)

- (b) Perform the following operations :

(i)  $(CD9)_{16} - (637)_8 = ( )_{16}$

(ii)  $(42)_{10} - (22)_{10} = ( )$  using 2's complement  
(6)

- (c) Perform the subtraction with the unsigned binary numbers by taking the 2's complement of the subtrahend.

(i)  $101101_2 - 1101_2$

(ii)  $100_2 - 110000_2$  (6)

6. (a) Simplify the following function using Karnaugh map

$$f(A, B, C, D) = \sum m(0, 1, 2, 4, 5, 7, 11, 15)$$

and draw the logic diagram for the simplified Boolean expression using NAND gates only.

(8)

P.T.O.

- (b) Draw the logic diagram of a 4-bit binary synchronous counter using JK flip-flops that trigger on the +ive edge. Explain its working using timing diagram. (7)
7. (a) Draw a logic diagram of edge trigger J-K flip-flop and explain its working. (5)
- (b) Construct a  $16 \times 1$  MUX with two  $8 \times 1$  and one  $2 \times 1$  MUXS. Use block diagram for the three MUXS. (5)
- (c) What is a shift register ? Explain the working of 4-bit controlled serial in – serial output shift register with logic diagram. (5)
8. (a) Give the truth tables of half and full adders. Also draw their circuits using basic logic gates. Show how a full adder can be made using two half adders. (10)
- (b) What are the various kinds of ROMS ? Discuss them in brief. Draw the diagram of simple diode ROM and explain its working. (5)