This question paper contains 4+2 printed pages]

Your Roll No. ....

238

B.Sc. Prog./II   **C**

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. selecting at least

two questions from each Section 'A' and Section 'B'.
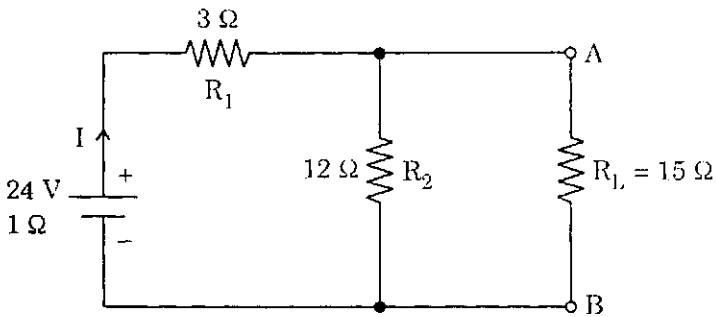
All questions carry equal marks.

Section 'A'

1.   (*a*)   State and explain Thevenin's theorem.   5

(*b*)   Derive the condition for transfer of maximum power from

a source to a load.   5

(*c*)   Apply Thevenin's theorem to the circuit given below and

find the current through R_1.   5

2.   (*a*)   Describe the various methods used for transistor

biasing. State their advantages and disadvantages.   7

(*b*)   What do you understand by class A, class B and

class C power amplifiers ?   3

(c)   Fig. below shows a silicon transistor biased by

feedback resistor method. Determine the operating

point. Given $\beta = 100$.   5

$$+V_{CC} = 20 \text{ V}$$

100 kΩ

1 kΩ
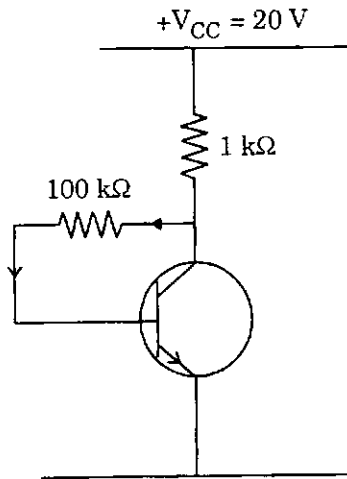
3.   (a)   With a neat sketch, explain the working of a full-wave

bridge rectifier.   8

(b)   Derive an expression for the efficiency and ripple factor

of a full-wave rectifier.   7

Section 'B'

4. (a) Perform the operation :

$$(A^7B)_{16} - (4^-6)_8 - (11011)_2 - (\quad)_{16}.$$ 6

(b) Subtract 38_{10} from 82_{16} using 2's complement method. 5

(c) Prove the following Boolean expression :

$$\overline{\overline{(A \cdot B\bar{C})} \cdot \overline{(\bar{A}B \cdot \bar{C})}} - A + B \oplus C.$$ 4

5. (a) Find MSP for the Boolean expression :

$$F(A, B, C, D) = \Sigma m(1, 3, 4, 5, 9, 10, 11) + \Sigma o(6, 8)$$

using Karnaugh method and implement it using <u>only</u>

NAND gates.   9

(b) Draw and explain the circuit for a TTL logic family

NAND gate.   6

6. (a) Draw the logic circuit diagram of 4-bit adder-cum-

        subtractor.   5

    (b) Implement a full-adder with two 4 × 1 MUXs using

        block diagram.   5

    (c) A combinational circuit is defined by the following

        Boolean function. Design the circuit with a decoder and

        external gate :

$$F = \bar{x}\,\bar{y}\,\bar{z} + x\bar{z} + \bar{x}y.$$ 5

7. (a) Draw the logic circuit diagram of a Master-Slave

        JK Flip-Flop and explain how it prevents racing ?   8

    (b) Draw the logic circuit diagram of 4-bit serial-in-serial

        out controlled shift-left register.   7

8.   (a)   Draw the logic circuit diagram of 4-bit asynchronous

UP DOWN counter and explain its operation.   7

(b)   How does a static RAM cell differ from a dynamic

RAM cell ?   3

(c)   Draw a block diagram for Bipolar 256 ⨯ 4 ROM and

explain its working.   5