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RN-8087

B. E. - II (Sem. III) (Electrical) Examination

May / June – 2010

Analog & Digital Electronics

(New Course)

Time : **3** Hours] [Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 2 (Sem. 3) (Electrical)**

Name of the Subject :

☛ **Analog & Digital Electronics**

☛Subject Code No. : **8 0 8 7** ☛Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) All abbreviations and symbols have their usual meanings.
(3) Missing data may be assumed wherever necessary.
(4) Figures on the **right** indicate full marks to that part.
(5) Answer to the two sections must be written in **separate** answer books.

SECTION - I

1 (a) Answer the following questions : **10**

(i) Draw the schematic of inverting comparator with input and output waveforms (a) If Vref is positive (b) If V_{ref} is negative.

(ii) Define a filter. How filters are classified?

(iii) What is a multivibrator circuit? What is its use? State its types.

(iv) Draw the frequencyt transistor circuit using PLL.

(v) Draw the block diagram of VFC32.

(b) Find the output voltage. When (a) $R_1=R_2=R_3=R_4$ = 2 k Ω and (b) $R_1 = R_2 = R_3$ = 2 k Ω and R4 = 2.2 k Ω. Assume ideal op-amp and the impedance at node A and node B do not load the preceding bridge circuit.

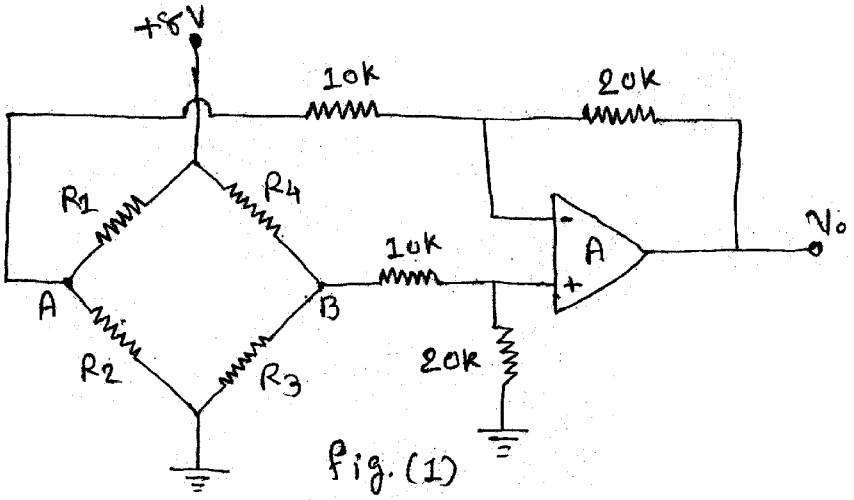

Fig. (1)

(c) Define the following terms of D/A converter : **4**
(i) Resolution
(ii) Monotonicity
(iii) Conversion time
(iv) Linearity.

2 (a) Explain in detail requirements of a good instrumentation amplifier. **4**

(b) The practical integrator circuit has R_1 = 10 k Ω , RF = 1 mΩ, C_F = 5nF. Sketch the output for the i/p shown in **Fig. 2**. **6**

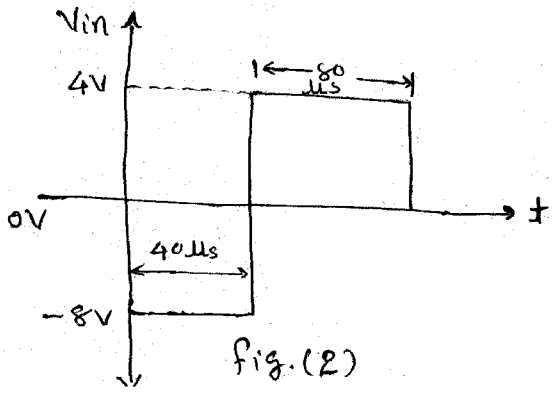

fig. (2)

(c) For the circuit shown in **Fig. 3** determine the output voltage V_o. **4**

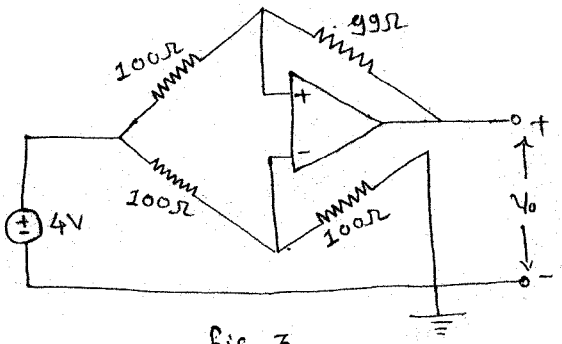

fig. 3

OR

(c) Draw and explain the basic CMOS inverter circuit. 4

3 Attempt any **three** out of four. 18

(i) For the circuit of **Fig. 4** show that $V_0 = G_1V_1 + G_2V_2 + G_3V_3$ and find the values of G_1, G_2 and G_3. Also find the values of V_0 if (a) R_4 is short circuited (b) R_4 is removed (c) R_1 is short circuited.

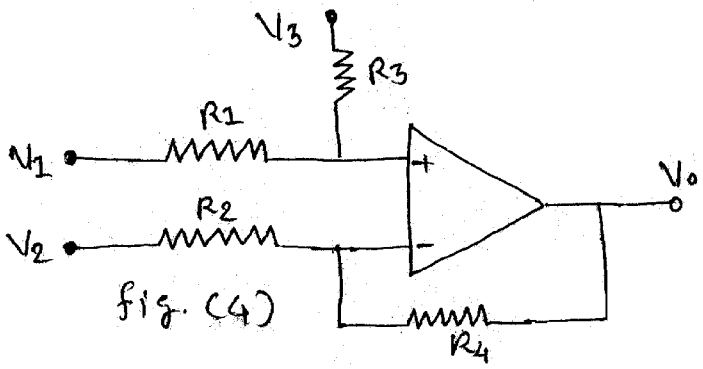

fig. (4)

(ii) Draw and explain the operation of astable multivibrator using op-amp.

(iii) Explain the working of op-amp inverting amplifier. Drive the expression for its voltage gain.

(iv) Find Vo for the circuit in **Fig. 5**.

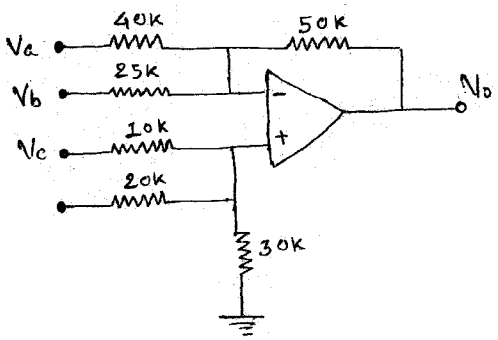

Fig. 5

SECTION - II

1 Attempt the following : **20**

(a) (i) Convert : **10**

(a) $(1011.01)_2 = (\quad)_{10}$

(b) $(204)_{10} = (\quad)_8$

(ii) Prove : $(A + \overline{B} + A\overline{B})\ (A + B)\ (\overline{A}B) = 0$

Symplify : $A\overline{B} + \overline{A}B + AB + \overline{A}\,\overline{B}$

(iii) Draw the circuit using NAND gate and NOR gate.
$F = AB + CD$

(iv) Simplify and draw the logic diagram using K'map

$F = \overline{A}\,\overline{B}\,\overline{C}D + \overline{A}B\overline{C}D + \overline{A}BCD + ABCD + A\overline{B}\,\overline{C}D + ABCD$

(v) Draw half adder circuit using its truth table.

(b) Prove that : fall adder circuit can be implemented using two half adder circuit. Using circuit and expression. **5**

(c) Implement the folowing multiple o/p function using a suitable decoder.

$F_1\ (A, B, C) = \sum m\ (1,5,6)$

$F_2\ (A, B, C) = \sum (0,2,4,6)$

2 Attempt any **two** : **10**

(i) Design (32 ×1) multiplexer circuit using four (8×1) multiplexer and one (2×4) decoder.

(ii) Implement a full adder circuit using demultiplexer.

(iii) Simplify the following expression once by considering the don't care condition and once by ignoring the don't care condition.

$F = \sum m(1,4,8,12,13,15) + d\ (3,14)$

3 Attempt any **two** : **10**

(i) Write

(a) Comparison between counters and register.

(b) Explain : Positive edge triggered D flip flop.

(c) Explain : Bidirectional shift register.
